TECHNOLOGY IN CULTURE AND THE ARTS:

A POLICY INFORMATION PAPER

M. Sharon Jeannotte
Social Policy Directorate
Department of Communications
August 1986

TECHNOLOGY IN CULTURE AND THE ARTS:

A POLICY INFORMATION PAPER

M. Sharon Jeannotte
Social Policy Directorate
Department of Communications
August 1986

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

* This section is based largely upon material developed in late 1984 and early 1985 by Floralove Katz, who was at that time an employee of the Social Policy Directorate of DOC.

EXECUTIVE SUMMARY

Since the 1950s, the Canadian economy has been in a process of transformation from a manufacturing to an information base. The latest figures from Statistics Canada indicate that the direct contribution of the information and services sector to the gross domestic product (GDP) is now 64 per cent, twice that of the natural resources and manufacturing sectors combined which account for roughly 32 per cent. Culture, as one component of the information and services sector, has consistently grown at a faster rate than total GDP since 1972 and now accounts for nearly 250,000 jobs and total receipts of about $15 billion. Moreover, the cultural sector is expected to grow faster than the rest of the economy for the foreseeable future.

This economic growth is tied to a concomitant increase in the amount of leisure time available to the average Canadian. Forecasters predict that the total number of leisure hours per week in Canada will rise from about 1 billion currently to 1.5 billion by the early 21st century. Cultural products will therefore be increasingly in demand. Almost 60 per cent of direct expenditures in the services and information sector are made by consumers, as opposed to 25 per cent in the manufacturing sector. Therefore, cultural products are well on the way to becoming the only true mass consumption products of the information economy.

The opportunities presented by the application of communications and informatics technology to the production and distribution of cultural content is the central focus of this paper. Because culture and the arts are so intensively content (or information) based, practically the entire spectrum of cultural activity can potentially be digitized. The paper suggests that the Department of Communications must focus increased attention on the linkages between technology and culture if Canada is to take full advantage of the challenges posed by the information age. This priority has also been identified by the department in its 1986 Annual Strategic Planning Session and is reflected in both of its major policy themes of Nation Building and National Pride.

Several respected experts have suggested that the only way that Canada can remain competitive in the high-tech field is to concentrate on the use of computers for the dissemination of information, particularly the value-added aspects of information processing. While Canadian hardware companies find it difficult to compete with offshore industries, the uniqueness and quality of our information is less easily overwhelmed by the sheer size of multinational high-tech companies. In some cultural fields, such as libraries, we have developed systems and databases which are among the best in the world. In many ways, however, we stand at a critical juncture, somewhat equivalent to the situation which prevailed 60 years ago in the feature film industry.

In the 1920s, the Hollywood "majors" had not yet consolidated their grip on the industry. A window of opportunity existed for the development of a Canadian production and distribution capacity. However, critical investments were not made at that time, and the Canadian film industry has been attempting to catch up ever since. We are now at a similar point in the emergence of a potentially massive cultural information industry, based (once again) on the application of new technologies to cultural production

and distribution. What Canada, led by the Department of Communications, does in this area over the next few years may well determine whether we remain in our traditional role as hewers of wood and drawers of water or whether we become one of the world leaders in applying computers and communications technologies to a whole host of cultural information opportunities.

Strategic Assessment

As the case studies examined in this report make abundantly clear, information technologies have already begun to play a significant role in the delivery of cultural content. Despite this fact, however, most cultural organizations and individual creators are experiencing difficulty introducing information technologies into their daily routines and using them effectively to produce, store or distribute cultural content. Some of the reasons for this include:

(1) lack of money;

(2) lack of information and advice on cultural applications of technology;

(3) philosophic differences between "scientific" and "artistic" approaches to technology;

(4) the decentralized and fragmented nature of the cultural environment (which includes both large and small commercial and non-profit organizations, individual creators and producers, retailers and heritage institutions);

(5) the relative lack of sophistication of cultural users of technology;

(6) incompatibility and lack of integration among hardware and software systems.

The paper examines in some detail both administrative and creative applications of technology in culture and the arts and focusses particularly on the opportunities and problems faced in each of these areas. In general, it concludes that both significant cultural and economic benefits can be derived from the following:

(1) large scale networking of cultural organizations (such as libraries, archives, museums, publishers, bookstores, and film and video sales and distribution outlets) which would provide the base for exchange and sale of massive amounts of cultural content currently inaccessible to the cultural community and the general public;

(2) electronic publishing of cultural data derived from existing and proposed cultural databases, either on-line or through media such as videodiscs and optical data disks (particularly in the compact CD-ROM format). Potential purchasers of such information would include educational institutions, researchers, business and the general public;

(3) the development and marketing of automated ticketing and box-offices systems, computerized lighting systems, "artist friendly" computer-generated imagery systems for film animation and product design, computer music and choreography applications, computer-controlled and enhanced performance and visual arts installations and museum exhibits;

(4) more extensive office automation of cultural organizations. If properly designed to meet the needs of this clientele, this could improve both the efficiency and effectiveness of the cultural community;

(5) increased attention to the research, development, training and information needs of cultural organizations in the area of new technologies.

Several common threads run though the case studies described in this paper. For the most part as cultural data exchange and information management becomes more important, increased emphasis must be placed on communications standards and protocols, database research and structuring and network coordination resources. In most cases, both money and expertise are lacking to address these problems. The result is generally a failure to maximize technological benefits, both in the content and software development spheres.

Many software applications are designed for business purposes and require modification to meet the needs of non-profit cultural organizations. Cultural organizations and creators would benefit from access to facilities and/or advice to perfect certain applications of the technology (for example, advanced imaging techniques or conversion of data to optical storage formats). However, such expertise is rare and is usually too expensive for the average artist or cultural organization to consider.

Finally, many private sector companies are eager to exploit the technology for creative and administrative purposes, particularly (but not exclusively) within the cultural industries. However, investment capital for this purpose is difficult to assemble because of the traditional reluctance of financial institutions to invest in cultural activities and the lack of public financing mechanisms which might provide leverage for private support. In several cases, Canadian companies described in this paper are being forced to seek venture capital in the United States and in Europe, resulting in the loss to Canada of potentially lucrative software and hardware products.

An Action Plan for Technology and Culture

This paper proposes that the Department of Communications take the lead in exploiting the opportunities described in the preceding section. The recommendations, for the most part, attempt to address the situation by maximizing the use of existing resources within the DOC portfolio and in the external environment. However, there is no doubt that additional resources will eventually be required to meet what may well be one of the key challenges of the portfolio in the coming years.

1. Internal Consultations

(a) Establishment of Focus

The primary need is to establish a focus and develop a strategy in the department for responding to the issues described in this paper. At present, none of the sectors have the expertise or the authority to take the lead in developing policies and program thrusts in the area of technology and culture. There are, however, a number of interested individuals scattered throughout the department and pockets of expertise on various applications located within DOC and the cultural agencies. The first step in increasing the synergy between DOC sectors and the agencies should be to begin consultations on how the portfolio and its cultural clientele can best capitalize on the opportunities outlined in this paper. The initiatives proposed cut across all cultural disciplines and require the talents and input of individuals from both the cultural and the communications sides of the department if they are to be achieved.

(b) Consultative Process: Initial Measures

Specific measures to begin this process might include the formation of an advisory committee or task force on technology in culture and the arts (as proposed in recommendation 9) which would include participation from Cultural Affairs and Broadcasting, Corporate Policy, Telecommunications and Technology and each of the cultural agencies. Although the Informatics Task Force proposed in the 1985-86 strategic priorities management plan was never formed, the thrusts of that project remain in current DOC priorities with regard to the creation of a national information network for the twenty-first century. Despite the shift in emphasis, the essence of recommendation 1 remains the same: to ensure that cultural representatives are among the service providers and users consulted in the development of departmental strategies in this area.

A number of measures could also be taken to improve the input of the cultural sector to such "communications side" programs as the University Research Program or its successor (see recommendation 7) and reciprocally, to provide for greater consultation with the technology centres of the department on the policies and grant awards made under "technology and culture" component of the Cultural Initiatives Program (see recommendation 8). Rationalization of the funding policies of the Cultural Initiatives Program and the Canada Council's Integrated Media Program also appears to be in order because, despite suggestions of overlap by some reviewers, many creative individuals and groups are "falling between the cracks" as far as funding for creative projects is concerned (see recommendation 10).

2. Introduction of New Measures

While internal portfolio consultations may help to heighten awareness and improve coordination among existing programs and responsibility centres, this paper suggests a number of new measures which should be

considered by the Department of Communications to improve cultural access to information, training, research and development funding, investment capital and expert advice.

(a) Research

The research function of the Department of Communications is currently being examined and reassessed. This examination provides an ideal opportunity to build support mechanisms for specific cultural concerns into a revised research mandate. In the past, the National Library of Canada has worked in consultation with departmental officials responsible for international liaison on Open System Interconnection (OSI) standards. Such collaboration has helped to make the National Library one of the world leaders in the testing and implementation of these computer networking standards. (See Section 6.1.A for a complete discussion of the Library's network experiments.) However, a more formalized and broadly based mechanism for placing cultural informatics issues on the agenda of departmental research priorities is needed and should be explored. This should include consideration of increased access by the cultural sector to both the human expertise and financial research resources currently resident within the department (see recommendation 5 and discussion). At the same time, increased resources for statistical research, impact studies and investigative studies of hardware and software issues of interest to the cultural community should also be made available from the research budgets of other DOC sectors (see recommendation 6).

Another source of possible support or expertise regarding cultural computing problems is the university community. The Department of Communications should therefore explore (perhaps as part of the re-examination of its research mandate) how university facilities, training resources and computer expertise might be made more accessible to the cultural community. For example, departmental financial participation might form one part of a tripartite partnership with industry and the universities to focus the efforts of specific facilities and personnel on both creative and administrative opportunities and problems in this area (see recommendation 5 and discussion).

A closer relationship between the research arm of DOC and its cultural clientele would strengthen the position of both and would be consistent with the rationale originally cited by the government when it brought culture and communications under the same administrative umbrella: "to ensure that communications policy is conducted with the highest concern for the cultural content and the cultural implications of communications technology" and "to make the cultural milieu more sensitive and more aware of the importance and the rapidity of technological progress in the field of communications." (DOC Annual Report, 1980-1981.)

(b) Development and Investment

One of the most pressing problems at the moment is to provide a source of seed financing or leverage for promising projects which apply private sector "know how" to the problems of cultural computing. Past experience has shown that support for commercially-oriented culture/technology initiatives is difficult to arrange through existing channels. If current proposals to increase cultural investment are approved, such mechanisms as conventional and convertible loans and loan guarantees might become available for innovative commercial applications of new technologies in culture and the arts. However, whatever funding vehicle is finally adopted, special attention must be focussed on this area. **Several valuable projects or potential projects described in this report (for example, in Sections 6.1.A, 6.3, 6.4 and 6.5) are in danger of being lost to Canada if Canadian enterpreneurs and developers do not receive adequate injections of venture capital.**

(c) Information

Two measures sorely needed by the cultural community are an information clearinghouse and a communications fund to provide documentation and advice to cultural personnel on current cultural applications of computer technology, the organization of workshops and conferences, and to assist in the publication of reports on technology and culture issues (see recommendations 2 and 3). While a few individuals and organizations are sophisticated users of computer technology, the majority of the cultural community requires a good deal of support in this area which it is not currently getting from any source. **The idea of an information clearinghouse was strongly endorsed by the participants at a recent national meeting on computers and cultural organizations.**

(d) Training

As in many other areas of the economy, technological change is affecting both the numbers and the skill levels of cultural personnel. **One of the priorities of the Cultural Affairs and Broadcasting Sector in its ongoing consultations with Employment and Immigration Canada should be to improve access by cultural organizations to training funds or resources needed to upgrade the technological expertise of existing personnel or to train new personnel (see recommendation 4). (This recommendation was also strongly endorsed by the national meeting referred to in (c) above.)**

(e) Artists-in-Residence Program

Accessibility to sophisticated computing facilities for fundamental research on artistic applications of new technology continues to be a severe problem for Canadian creators. Funds are not likely to become available for the construction of costly

new facilities, but this paper suggests that DOC begin discussions with the cultural agencies on the possibility of opening their computing and communications facilities to artists (see recommendation 11). Such a program might be administered by the Canada Council which already sponsors an artist-in-residence program at the National Museum of Science and Technology. Possible participants might include the federal cultural agencies, DOC itself, other federal departments or agencies, post-secondary institutions, private sector corporations and provincial government agencies.

3. External Consultations

There is also a need for the Department of Communications to take the lead in developing a wider consensus outside of the portfolio on the importance of technology and culture issues. For many of the provinces this is an emerging issue, and most have not yet developed programs and policies in this area. Mechanisms such as the Economic and Regional Development Agreements (ERDAs) which have been used in the past to finance provincial priorities (such as the Electronic Publishing Program funded under the Manitoba ERDA Subsidiary Agreement on Communications and Cultural Enterprises in March 1985) should be used more extensively to encourage development of technological applications in culture and the arts. **Cultural organizations, at a recent national meeting, have also urged the federal and provincial governments to coordinate their funding efforts for culture/technology projects, since priorities now appear to be established unilaterally without consideration of other levels of government or the cultural community itself.**

A number of other mechanisms (see recommendation 12) are also proposed to increase the level of awareness and enlist the cooperation of other organizations such as the universities, the private sector and the national and provincial cultural service organizations in addressing technology issues with significant potential benefits for the cultural community and the software/hardware industries in Canada. (Specific partnerships in the area of electronic publishing are also proposed in detail in the body of this report: see particularly sub-sections 6.5.3 and 6.5.4.)

RECOMMENDATIONS

Note: For a broader understanding of the rationale behind these recommendations, the reader should refer to the discussion in sections 3, 4 and 5 of this paper.

1. It is recommended that the proposed Informatics Task Force (or other initiatives arising from current DOC priorities) make provision for including respresentatives of the cultural sector among the "private sector users" and "informatics products and service providers" to be consulted in the development of future DOC strategies in this area.

2. It is recommended that the Department of Communications take the necessary steps to introduce a clearing house of information on technological applications in culture and the arts to be made freely available, on request, to cultural organizations and individual artists seeking background documentation on current applications.

3. It is recommended that the Department of Communications, as part of its enhanced leadership role in this area, seek to identify possible sources of support for a technology and culture communications fund which would provide assistance to cultural groups wishing to organize workshops and conferences on the subject area. Assistance from this source should also be made available for the publication and dissemination of proceedings and reports emanating from these events.

4. It is recommended that the Department of Communications take measures to improve access by cultural organizations to training funds or resources which would allow them to upgrade the technological expertise of existing personnel or to train new personnel in culture/technology applications.

5. It is further recommended that the Department of Communications establish mechanisms which will improve cultural access to research, development and investment funds for innovative projects involving communications and informatics technologies. Such projects might include long-term network and database development or specific applications such as improved box-office software, dance notation systems, computer imaging techniques or electronic publishing ventures on new media such as optical data disks.

6. It is recommended that money should be made more freely available for impact studies on the cultural organizations that have already automated and for the investigation of issues such as copyright and security of data in automated systems, particularly as these affect artists and cultural organizations. Basic statistical research should also be funded to determine the extent of current automation within specific disciplines (e.g. theatres, libraries) and future plans for the introduction of computerized systems.

7. The University Research Program or its successor is potentially a valuable tool in an overall strategy aimed at focussing and refining the Department of Communications' policies regarding the interface between technology and culture. It is therefore recommended that it or a similar type of program be retained in the Department and restructured to permit greater cultural access to all components. As part of such a restructuring, the Cultural Affairs and Broadcasting Sector should be encouraged to make a greater effort to submit promising technology-related projects from each of the cultural disciplines to the appropriate components of the Program.

8. It is recommended that the Cultural Initiatives Program set up more formal mechanisms of consultation with other responsibility centres within the Department regarding technology and culture projects submitted to it for funding. Such areas as the Technology and Policy Assessment Branch, the Social Policy Directorate, the Industry and Economic Development Branch, the Canadian Workplace Automation Research Centre and the Informatics Systems Research and Development Branch might be invited to participate. Not all this expertise need be brought to bear on each individual project, but regular round table sessions with representatives of all these groups might give CIP a broader contextual basis on which to make its funding recommendations and would help to provide the communications side of the Department with a clearer insight into cultural computing priorities and problems.

9. It is recommended that the Department of Communications establish an Advisory Committee on Technology in Culture and the Arts with representation from the Cultural Affairs and Broadcasting Sector, the Corporate Policy Sector, the Telecommunications and Technology Sector and each of the cultural agencies. While it is recognized that the Department cannot give direction to the agencies on the scope or implementation of individual initiatives, it is important for DOC to attempt to develop an overall federal consensus and strategy if it hopes to make the most of Canada's potential strengths and assets in the informatics field.

10. It is recommended that <u>either</u>:

    - the budget of the Canada Council's Integrated Media Program be increased to permit larger grants to individual artists for creative projects, particularly for the purchase of required hardware and software;

    <u>or</u>

    - the criteria of the Cultural Initiatives Program be revised to permit arts organizations to apply for financial assistance to purchase computer hardware and software for creative purposes under the same terms as for equipment purchased for management purposes.

11. It is recommended that the Department of Communications investigate mechanisms (perhaps through the Advisory Committee proposed in Recommendation 9) whereby artist-in-residence programs could be established for Canadian artists working with new technologies. Possible sites for such residencies might include federal cultural agencies (for example, the National Museums of Canada, the NFB or the CBC), the Department of Communications itself (the Communications Research Centre), other federal departments and agencies (such as the National Research Council), postsecondary institutions (universities and colleges), private sector corporations (such as the private broadcast networks) and provincial government agencies (such as TV Ontario or Access Alberta).

12. It is recommended that the Department of Communications utilize all the mechanisms suggested in the preceding recommendations as tools to enlist the provinces, the universities, the private sector and the national and provincial cultural service organizations in a concerted effort to address technology issues of particular concern to the cultural user community. These mechanisms might include (but are not necessarily limited) to the following:

    a) further national meetings on specifically identified issues of concern;

    b) exchange of information through the proposed DOC clearing house;

    c) funding of workshops and conferences, either through existing programs or through the proposed technology and culture communications fund;

    d) partnerships with the universities and the communications/ information technology industry, perhaps as part of a revised research mandate for the Department or through the proposed mechanisms to increase investment in Canadian cultural industries;

    e) studies and statistical research, perhaps funded under the Strategic Reserve, through existing DOC professional services budgets or the Culture Statistics Program;

    f) funding under the Cultural Initiatives Program of specific proposals which provide the national or provincial cultural service organizations with the resources to tackle cultural computing problems at a cross-disciplinary or regional level;

    g) more funding of provincial priorities in the cultural informatics area through the Economic and Regional Development Agreements (ERDAS) or through the Science and Technology Sub-Agreements.

KEY TO THIS POLICY/INFORMATION PAPER

Section 1 - defines how the terms "culture" and "technology" are being used and describes the structure and scope of the paper.

Section 2 - traces the recent history of technology and the arts in Canada and highlights various events, programs and policy initiatives that have heightened awareness or increased access to resources in this area.

Section 3 - briefly focusses on the problems and opportunities faced by creators wishing to make use of new technologies.

Section 4 - briefly focusses on the problems and opportunities inherent in the application of technology to the "business" of culture - the production, distribution and administrative structures required to put cultural products in the hands of consumers.

Section 5 - outlines a number of initiatives the Department of Communications should take to address some of the main research, development, information and training needs of the cultural community in the technological area.

Section 6.1 - defines the scope of database and network development among cultural organizations and describes in detail nine major projects launched over the past few years by or with the help of DOC and the cultural agencies.

Section 6.2 - describes the reasons for introducing office automation in cultural organizations, provides statistics on the extent of such automation and traces the experience of four cultural organizations that have actually automated their offices, focussing on the quality of consultation and advice they received, as well as on training, productivity and satisfaction issues related to the introduction of automated systems.

Section 6.3 - defines "computerized ticketing" and "box-office automation", describes the products of some of the major Canadian firms operating in this area, provides Canadian box-office statistics and focusses on future directions and opportunities in this area, particularly for improving the financial position of the Canadian performing arts through computerization of ticket-selling and box-office functions.

Section 6.4 - describes the process of stage lighting design, placement and manipulation, shows how computers can introduce significant creative and cost benefits in this area and describes the innovations proposed by one Canadian company.

Section 6.5 - describes how telecommunications, videotex and optical storage technologies are being used creatively by artists and for the electronic publishing of cultural information. Terms are defined, factors in production and consumption are analyzed, several significant Canadian applications are described and the problems and opportunities in this area are highlighted.

Section 7.1 - describes the history of the development of computer music both in Canada and abroad.

Section 7.2 - describes the use of computers for the composition, analysis and synthesis of music, focussing on the complexities and possibilities inherent in the technology.

Section 7.3 - describes some of the work currently underway in Canada and abroad to use the computer as a tool for the composition and editing of dance movement and for teaching choreography to dancers.

Section 7.4 - explores the use of computer imaging systems by Canadian artists and universities and outlines some of the support mechanisms currently in place to fund this development.

Section 7.5 - defines artistic use of holography, focusses on the major Canadian practitioners in this field and reviews some of the non-artistic "spin-offs".

Section 7.6 - reviews some of the aesthetic issues surrounding the use of new technologies for the production of art.

1. INTRODUCTION

> The acquisition, storage, representation, manipulation and distribution of information has always been part of human activity. It is the essence of thought, education, communication and language. The fact that these processes are increasingly being conducted by machines through networks based on computers and microelectronics is the new and powerful force to which human beings must adapt. Western society appears to be constructing a nervous system that is external to itself, but one that, through an intricate weave of electrical impulses, mirrors and amplifies human needs and knowledge.[1]

Knowledge may be power, but information is the lifeblood of culture and the arts. Whether this information takes the form of books in libraries, artifacts in museums, words spoken on stage or programs broadcast over the airwaves, the cultural worker trades in information every day. It is the essential element of artistic and cultural production for without information there is no meaning, and without meaning, culture and the arts cease to have any relevance for their audience.

This point may appear self-evident but it deserves to be emphasized at the beginning of this paper because it has only recently been thrown into sharp focus by what has been termed the information or microelectronics revolution. Before this revolution, a painting was a painting and a dance performance was a dance performance. There was no common ground between various forms of artistic and cultural production or distribution, except possibly the indefinable creative spark that brought them into being. Today, painters are digitizing images using computer technology, and dancers are using microelectronics both as tools for recording choreography and as partners in the performance environment. Moreover, the same microcomputer that controls a bank of slide projectors during a multimedia dance performance can be used to tally the day's receipts or print 1000 letters soliciting funds from the company's supporters. The full spectrum of cultural production, distribution and administration can potentially be reduced to the common denominator of electronic impulses in the heart of a silicon chip. This simple fact has countless implications for culture and the arts in Canada - implications which we are only beginning to understand.

To focus the discussion which follows, it will be necessary to define exactly how the very vague and elastic terms "culture" and "technology" are being used. "Culture" in this context is being defined as those activities falling within the mandate and portfolio of the Minister of Communications. The definition therefore includes the performing arts (music, dance, theatre), the visual arts (fine arts, crafts, commercial art and photography), literature, heritage (galleries, museums, archives), libraries and the cultural industries of radio, television, film, video, sound recording and

---

1. "Arthur J. Cordell, The Uneasy Eighties: The Transition to an Information Society. (Ottawa: Science Council of Canada, March 1985), p. 133.

publishing (books, periodicals and newspapers).[2] "Technology" in this paper generally means computer technology, advanced telecommunications and satellite technologies, optical (video) discs, optical digital discs, videotex and holography used singly or in combination with each other.[3]

However, within this paper, it should be noted that little attention is focussed on the area of broadcasting, whether over-the-air or cable transmitted. The reason for this omission is simply that the impact of new technologies (such as high-definition television, direct broadcasting satellites, videocassette recorders and fibre optics) on conventional broadcasting has already been the subject of several departmental studies. This area is likely to continue to receive special attention from the Department of Communications, and therefore lies outside the focus of the paper's main recommendations.

Another area not treated specifically is electronic publishing. This technological development is likely to affect not only conventional publishers, as we now define them, but also a whole host of other information providers such as financial houses, mass retailers and educational institutions. It is therefore a subject which goes well beyond the definition of "culture" used in this paper. While it deserves more general examination, discussion of electronic publishing in this paper has been confined to the initiatives undertaken by cultural groups as a result of experiments with databases, networks and new media such as videotex and optical storage technologies.

Technological applications in culture and the arts can be further subdivided into two streams - administrative and creative. Administrative applications are those which have to do with the "business" of culture. In some ways, the administrative needs of cultural organizations, particularly in the area of office automation, are similar to those of any other organization. However, because of the specialized nature of cultural activity, administrative applications concerned with the gathering and communication of information are especially significant, and frequently crucial, for the efficiency and effectiveness of a cultural endeavour. Creative applications, on the other hand, usually start out as unique to culture and the arts. However, artistic experimentation with technologies such as holography have sometimes led to advances which have subsequently been adopted by business and advertising. For example, mass reproduction of holographic images on credit cards has reduced the incidence of counterfeiting and fraud. Closer to home, one can cite the success of Alias Research Inc. - a small Toronto-based graphics company founded in 1983 by a group of artists

---

2. This definition also conforms to the parameters of Statistics Canada's Culture Statistics Programme. (See Culture Statistics Programme: A First Review by the National Advisory Committee on Culture Statistics, Ottawa: no publisher indicated, August 1984, p. 1.

3. This definition roughly conforms to that utilized by the Department of Communications' Cultural Initiatives Program to assess applications for assistance for new technology projects.

who met in the graphics laboratory of Sheridan College in Oakville. Alias, with support under the federal government's Scientific Research Tax Credits program, developed a "designer-friendly" work station and advanced graphics software package capable of manipulating complex 3-D images to produce designs of photographic realism. In 1985, General Motors of Detroit purchased one of these systems for $500,000 and in 1986 will purchase 35 more (one for each of its car design studios). Not all artistic experimentation with new technology is as financially successful, but the potential is there to harness artistic creativity and imagination for the benefit of both the cultural community and the economy as a whole.

Because the pace of change and development in the information society is so rapid, this paper could not begin to cover all types of technological development in the cultural field. What follows is more of a selective survey, concentrating mainly but not exclusively on the use of computer and communications technologies in Canadian culture and the arts.

A descriptive approach is taken, outlining both the history and development of particular applications and citing specific projects which are indicative of the scope and variety of initiatives that have already taken place. In a number of cases, significant problems or areas requiring further research and development are highlighted to give the reader a sense of both desirable and undesirable future directions for federal policy development in this field. It should also be noted that the creative applications section was written almost a year ago and, because of the rapid pace of change, is already somewhat outdated. In all cases, the reader should be aware that what is being presented is a "snapshot" which, like all snapshots, is only indicative of reality at one very fleeting point in time.

The administrative applications covered include databases and networks, office automation, computerized box-offices, computerized lighting and cultural uses of telecommunications, videotex and optical storage technologies. The creative uses described are electronic and computer music, computerized dance notation, computer-generated imagery and holography.

2. ENVIRONMENT

The dynamic relationship between technology and the arts dates back to the beginning of human society. During the Middle Ages, the greatest engineering feats, Gothic cathedrals for example, were built by artists and artisans who had no formal scientific or technical training. During the Renaissance, the most outstanding artists, Da Vinci, Michelangelo and others, also figured among the most prominent scientists. The artist used existing technologies to create art, but also used the arts to create "new technologies".[4]

By the 1850's however, the industrial revolution had severed the traditional and intimate linkage between science and art. Whereas previously "art" had been understood to be anything new and innovative, afterward only that which was unique and could not be mass produced was considered art. From that time until very recently, the fine arts have resisted borrowing from technology and applying change because of aesthetics, resulting in the common perception that art is a "painting some guys... did 100 years ago in Paris and Italy".[5]

The movement to reunite technology with culture has accelerated in particular during the past ten years, corresponding roughly to the period since the commercial introduction of microcomputer technology. In April 1976 Apple Computer Inc. was formed and that summer Keuffel and Esser ceased production of slide rules and donated its last one to the Smithsonian.[6] The same technology that rendered the slide rule obsolete also allowed small-scale cultural organizations and individual creators to gain access for the first time to tools capable of transforming both the production and distribution of cultural works.

By 1980, the federal government had taken the first formal step toward recognition of the link between communications technologies and culture by transferring responsibility for cultural affairs to the Department of Communications. By 1982, the Federal Cultural Policy Review Committee was advocating explicit measures to reinforce this linkage:

> A primary function of the federal department housing the Arts and Culture Branch is to assist in providing the environment in which cultural life may flourish and the cultural agencies may best achieve their purposes. In the course of advising the minister on broad cultural policy directions, departmental officials

---

4. Harry Chartrand, An economic impact assessment of the arts, Arts Research, Research & Evaluation, Canada Council, Ottawa, August 23, 1983.

5. Bill Viola, "The real technological revolution", Cinema Canada, January 1985, p. 11.

6. Gregg Williams and Mark Welch, "A Microcomputing Timeline", Byte, September 1985, p. 200.

> should pursue this primary function by fostering communication and consultation, providing an accurate knowledge base for cultural activities, and assisting artists and cultural groups to make the fullest use of appropriate technologies.[7]

In 1983, a number of federal initiatives were introduced which could be interpreted as a response to this recommendation. In April 1983, the Media Arts Section of the Canada Council was inaugurated to encourage and support the development and applications of media programmed creatively by artists, with a focus on film, video, audio and holographic media and with immediate and serious consideration of artists working in computer processing, imaging (audio and video) or system control, videotex and teletext, laser techniques, videodisc and optical storage. Also in April 1983, the Special Program of Cultural Initiatives (SPCI), administered by the Cultural Affairs Sector of the Department of Communications, introduced two components aimed at providing assistance to cultural organizations for the innovative use of new communications technologies and for the purchase of computer hardware to promote improved management. In July of the same year, the Department of Communications also launched the Telidon Content Development Programme which was intended to encourage Canadian companies, non-profit organizations and individuals to develop sophisticated and innovative software and content for Telidon videotex systems.[8] During this period DOC's Book Publishing Development Program was also becoming increasingly active in providing assistance to book publishers for computerization of their operations. During the period between 1981 and 1984, over 50 firms received support from the Program for management information and other computer projects.[9]

The response to these initiatives signalled a cultural community eager to begin experimentation with new technologies. Some 75 artists and arts organizations have already benefited from funding provided by the Canada Council.[10] In the two years between April 1983 and March 1985, almost $2,000,000 was dispensed by the technology components of SPCI in support of over eighty projects involving the use of new technologies which were sponsored by cultural organizations both large and small.[11] The

---

7. Recommendation 8, Report of the Federal Cultural Policy Review Committee, Ottawa: Department of Supply and Services, 1982, p. 52.

8. Telidon, introduced in 1978, was developed at DOC's Communications Research Centre and, because of its superior and realistic colour graphics, has since become the North American standard for teletex and videotex - the transmission, storage and retrieval of graphics and text by both large and small computers.

9. Woods Gordon Management Consultants, Computer Study: Book Publishing Development Program, Toronto: September 1984, p. 1.

10. Information sheet published by the Canada Council.

11. Program information provided by SPCI.

Telidon Content Development Programme furnished almost $5 million to 27 projects before it was terminated in 1985.[12] Although the clientele for the Telidon grants was not primarily "cultural", as defined by this paper, many of the projects involved the production of educational software, special community service databases and other non-commercial services with potential applications in the cultural field.

Federal attention to the area of culture and technology has been reflected to a lesser extent by the provinces. In April 1984, the Ontario Special Committee for the Arts (the Macaulay Committee) made a number of recommendations concerning the issue, proposing that an interministerial committee be formed to:

(i) identify the various forms of communications and estimate their technological impacts on the arts, the media, libraries, schools, museums, etc. so that appropriate and timely responses are involved by the Ministry and its planning;

(ii) develop strategies to support and encourage Canadian producers of software and program content;

(iii) identify new formulae and new sources for television programming, computer software, etc.;

(iv) develop data banks;

(v) develop policy, defining the role of government in the technology age;

(vi) identify areas where new technology may threaten jobs and existing industry - and develop compensating strategies.[13]

Financial support for creative and administrative uses of technology in culture and the arts varies from province to province. In Ontario, assistance is available under the Ministry of Citizenship and Culture's program grants (formerly Wintario grants) for the purchase of computer hardware by cultural organizations. A recently introduced program administered by the Libraries Branch of the Ministry has earmarked $1.3 million this year and $1 million to be spent each year over the next four years for the automation of Ontario libraries.[14] The Ontario Arts Council also provides

---

12. Government of Canada, Department of Communications News Release, "Fox announces 27 projects eligible for Telidon Content Development Program grants", January 13, 1984.

13. R.W. Macaulay, Report to the Honourable Susan Fish, The Minister of Citizenship and Culture, by the Special Committee for the Arts, Volume I, Toronto: Ontario Special Committee for the Arts, Spring 1984, pp. 17/9 and 17/10.

14. Information provided by Bonnie Campbell, Libraries Branch, Ministry of Citizenship and Culture.

assistance for professional artists to produce works or experiment with the creative potential of electronic media.[15] In Quebec, the Ministère des Affaires culturelles furnished almost $200,000 in 1984-1985 under its program "Intervention nouvelle - Art et Innovation" which encourages creative experimentation with new technologies by professional artists of all disciplines.

While most other provinces will look at automation projects within the boundaries of existing programs of support for cultural organizations and artists, few have gone as far as Ontario and Quebec in explicitly designating funds for this purpose. Provinces such as Alberta and Saskatchewan have provided significant amounts of lottery revenue funds to cultural organizations for the purchase of computer hardware for management purposes. Other provinces, such as New Brunswick and Newfoundland, with less robust revenue sources, have been unable to consider more than token commitments to technological innovation within their cultural communities.[16]

Like the chicken and the egg, it is difficult to tell what came first - widespread cultural interest in computing or the financial programs to support that interest. However, it is an undeniable fact that, starting in about 1979, the cultural community itself began to organize and sponsor numerous events to explore various facets of the relationship between technology and culture. In 1979, the Photo/Electric Arts Foundation of Toronto sponsored the first Computer Culture Exposition, a conference and exposition highlighting the humanist aspects of micro-electronic technology. This event was repeated in 1980 and 1981 (as Computer Culture '81) in Toronto and continued in 1983 in France in collaboration with the Centre international de recherche, de création et d'animation (CIRCA) as Informatique/Culture, Computer Culture '83.[17] On the west coast, the International Computer Arts Society sponsored Digicon conferences in 1983 and 1985 which focussed on "computers, creativity and the human spirit" as manifested by musicians, visual artists, filmmakers and dancers working with digital technologies.[18] "Convergences", an international

---

15. Information provided by Judy Gouin, Film, Photography and Video Officer, Ontario Arts Council.

16. This information has been obtained from an examination of applications for financial assistance for new technology projects submitted to the Special Program of Cultural Initiatives and its successor, the Cultural Initiatives Program, over the past 2½ years, and from an informal survey conducted through the Regional Offices of the Department of Communications. The assessment is therefore impressionistic rather than rigorous and points to the need for a more complete and coherent survey of provincial policies and programs with regard to technology and culture.

17. Appendix to "Computers and Computer Cultures", a paper prepared by Richard Hill of the Ontario College of Art for the Culture and Technology Conference, University of Ottawa, May 1985.

18. Jane Hutton and Tom Berryhill, "From the Editors", Digitalk, Spring 1985, p. 1.

conference held in Montreal in late 1984, focussed on the meeting of film and video production technologies and featured workshops and seminars on electronic imaging systems, computer assisted editing, music video and computer animation.[19] In June 1984, Halifax played host to the "Artists Talk About Technology", conference which was sponsored by the Association of National Non-profit Artists' Centres (ANNPAC). Artists used this forum to explore creative issues such as the aesthetics of technologically-based art, the artist's role in "humanizing" technology and the "politics" of access and control over technology by relatively powerless groups such as artists.[20] This dialogue continued at the Ontario Association of Art Galleries' "Electro Culture" conference, held in Toronto in November 1985 and expanded to include the vital question of alternative support for artistic exploration of new technologies in an economic climate characterized by shrinking government grants. Meanwhile, the cultural industries and the heritage sector have also been actively and publicly considering the impact of computers on their activities at such events as the Canadian Conference on Electronic Publishing, held in Vancouver in August 1985, and the international Museum Computer Network Annual Meeting (which took place in Ottawa for the first time in October 1984).

---

19. Lois Siegal, "Animation and the Computer," Cinema Canada, January 1985, p. 9.

20. Artists Talk About Technology, Toronto: ANNPAC, 1985.

3. CREATIVE APPLICATIONS OF TECHNOLOGY

Conceptually, this paper suggests that the activity of cultural computing can be divided into two related but not identical areas of concern - creative and administrative. The creative aspects are probably the most glamorous and exciting, but they are also the more problematic. To borrow, with slight modification, the famous phrase of the Fowler Committee on Broadcasting, "The only thing that really matters in culture is creation; all the rest is housekeeping." Unfortunately for the creators, housekeeping is what most of the rest of us can understand. Somebody has to write the books or the music that is electronically catalogued. It is apparently a lot easier, however, to convince government to fund a cataloguing system than to give a writer access to a word processor.

It is perhaps ironic that Canadian artists are among the most enthusiastic proponents of new technology at the very moment when the national cultural identity is being threatened as never before by the tidal wave of new technologies. Arthur Kroker, in an extraordinary book entitled Technology and the Canadian Mind, summarizes succinctly what we as a nation now must face:

> The Québec film-maker, Jean-Claude Labrecque, once said of the threat of cultural obliteration posed by the new technologies of communication: "It's like snow: it keeps falling and all you can do is go on shovelling". Technology as snow, or maybe as a nuclear winter; that's the Canadian, and by extension, world situation now. If we wish to survive cultural extermination, then our main chance is just what Labrecque says: "we must be original or disappear". Jean-Paul Sartre might have cautioned the Europeans that they were "condemned to be free" as the price of modernism; but Labrecque notes that the Canadian fate is simply this: "create or perish".[21]

Canadian creators are making use of technology to produce everything from rock videos to computer-controlled sculpture to totally synthesized symphonies. This activity should be encouraged, but the principal roadblocks which prevent the Department of Communications from taking an active role in promoting this kind of creativity are three-fold:

i) lack of money;

ii) lack of a mandate, since the funding of artistic creativity has traditionally been relegated at the federal level almost exclusively to the Canada Council;

---

21. Arthur Kroker, Technology and the Canadian Mind: Innis/McLuhan/Grant, Montreal: New World Perspectives, 1984, p. 129. The quotation from Jean-Claude Labrecque is taken from Michael Dorland's article "Film and Memory: The Cinematic Style of Jean-Claude Labrecque", Cinema Canada, No. 103, January 1984, pp. 7-10.

iii) philosophical differences between the "scientific" and "artistic" approaches to technology.

The last point is briefly touched upon in Section 6.1.E.4, where the artistic approach of "soft mastery" of the technology is contrasted with the scientific and technical tendency toward "hard mastery". Sherry Turkle in The Second Self: Computers and the Human Spirit defines hard mastery as "the imposition of will over the machine through the implementation of a plan" and soft mastery as "more interactive... try this, wait for a response, try something else, let the overall shape emerge from an interaction with the medium."[22] The discussion is relevant in this context because it reflects the dissimilar approaches of the respective clienteles of the communications and cultural sides of the Department of Communications. This philosophical difference has hampered communications between these groups, suggesting that there exists a definite need for an "interpreter" to bridge the gulf between these virtually separate "cultures".

Efforts have been made in the past to create such bridges. For example, the Social Policy Directorate of DOC at one point in the preparation of this paper approached the Communications Research Centre about the possibility of developing an artist-in-residence program at that facility. For various reasons, this was never pursued, but it does represent the germ of an idea which is more fully explored below. In the more distant past (1982), an ambitious proposal was drafted by the Department's Research Sector to establish an Electronics and the Humanities Branch which would conduct research on human communications, develop and evaluate new tools for creative expression and communication, and operate a national laboratory where artists could experiment with modern communications and information technology.[23] The proposal was rejected by the Communications Research Advisory Board and was never pursued.

The Department of Communications may in the past have viewed support for artistic experimentation with technology as being outside its mandate and sphere of interest. The Minister's responsibilities do, however, include the needs of creators, and a real opportunity exists for the Department to take the lead in encouraging artistic creation with technology. A number of mechanisms are available to the Department which are described below in the section on "Cooperation and Coordination".

---

22. Sherry Turkle, The Second Self: Computers and the Human Spirit, New York: Simon and Schuster, 1984, pp. 104-5.

23. Research Sector, Department of Communications, "Information Research Section of the Five Year Plan", March 1982, p. 3.

4. ADMINISTRATIVE APPLICATIONS OF TECHNOLOGY

4.1 General Problems with Technology in Administration

Dr. James R. Taylor, a Professor of Communications at the Université de Montréal and a scientific advisor to DOC's Canadian Workplace Automation Research Centre, has commented recently on some of the surprising findings of Department of Communications' Office Communications Systems field trials. His summary of the results was as follows:

i) Systems failed to perform as well as advertised.

ii) Systems take much more time to learn than anyone had foreseen. Everybody underbudgeted for training.

iii) Even when they had been learned, the systems offered less than people expected. (For example, most people found it easier to enter their appointments in pocket diaries than to go through several layers of software to call up their electronic calendars.)

iv) Existing equipment is too often incompatible and cannot be integrated into a coherent system.[24]

The problem, according to Dr. Taylor, is that the computer industry has fallen into a pattern of developing the product and then finding users for it. The only option for Canada, he believes, if it wishes to maintain an international presence in the high-tech industry, is to reverse this state of affairs and to develop an industry which is user-oriented.

> Reversing the pattern means starting the R&D cycle in the office, designing systems that meet the specific needs of particular work environments. The research challenge is to understand the nature of the office work system and to identify its particular communications and intelligence handling problems. The development challenge is one of integration of existing and new technology into coherent systems that are responsive to actual needs - needs that vary much more greatly than we think from one working environment to another.[25]

4.2 Specific Problems with Technology in Cultural Administration

It is obvious that the cultural sector has a number of unique and difficult information processing needs. The environment is, for the most part,

---

24. James R. Taylor, "The Computerization Crisis: End of a Dream or Threshold of Opportunity?", a paper presented to the International Symposium on the Impact of New Information Technologies on the Workplace, Montreal, November 3-5, 1985, pp. 5-6.

25. James R. Taylor, p. 16.

i) decentralized;

ii) made up of both large and small organizations;

iii) preoccupied with the storage and dissemination of information;

iv) populated by relatively unsophisticated users;

v) not particularly wealthy; but

vi) likely to be a "growth industry" in the coming decades as both the demand for information/entertainment and the amount of personal leisure time increases.

John Kettle, a prominent Canadian forecaster, predicts that by the early 21st century the average work week will have dropped to about 25 hours while the amount of time available for leisure will have increased to 59 hours. This means that the total number of leisure hours per week in Canada will rise from about 1 billion currently to 1.5 billion by the early 21st century.[26] Cultural activities, along with sports and education, are therefore likely to be in greater demand throughout the final decades of this century and the early part of the next. But as consumers borrow and purchase more books, visit more museums and galleries, attend more movies, rent more videocassettes, buy more sound recordings, watch more television and attend more live performances, will the cultural sector be in a position to respond to this demand?

Quite apart from the creativity required to produce Canadian cultural products to meet consumer demand, there will be a need to upgrade the distribution systems that put this product in the hands of the Canadian public. In most cases, this distribution system is dependent upon the administrative strength of the cultural industries and organizations that serve as intermediaries between the creator and his/her audience. The central issue which this paper addresses in the section on "Technology and the "Business" of Culture" is whether new technologies have a role to play in improving the efficiency and effectiveness of cultural administration and, if so, will this be a significant role?.

One of the problems in the area of technology and culture is a lack of statistical information on the current and potential impacts of automation on the "business" of distributing cultural products. There are, however, some examples to be drawn from the cases examined in this paper which suggest that the potential impact is significant.

Figures provided by the National Library of Canada indicate that approximately $4 million and 35 person years annually will be required to develop and manage the Canadian Library and Information Network (see Section 6.1). However, this investment is aimed at improving bibliographic information

---

26. John Kettle, FutureLetter, September 30, 1985.

exchange among a potential 5,000 participating Canadian libraries with total budgets exceeding $900 million annually. This scenario would take place in an environment where over $1 billion is already being spent annually to retrieve information from electronic libraries and where the growth rate is projected to be 30 per cent a year.

Other sources estimate that over 60 million tickets are sold annually in Canada for performing arts, theatre and general entertainment events. Currently, only about 20 per cent of Canadian box-offices are computerized. However, box-office automation, if properly applied can enhance subscription packaging and management, fundraising and mailing campaign management, and accounting, as well as making tickets for cultural events more widely available over a larger geographical area. Improvements in box-office revenues as a result of computerization could significantly ameliorate the economic situation of performing arts companies, provided that sufficient care is taken to install systems that are compatible and meet the needs of the organizations managing the performance venues. (See Section 6.3 for a more complete discussion.)

In the publishing and bookselling sectors, experts suggest that financial success is hampered by low inventory turnover (three times a year when six to eight times yearly would be optimal) and by distribution inefficiencies (primarily a slow book order fulfillment process and a high rate of returns). (See Section 6.1.B for details.) An automated book purchase order service has already been established for the English-language book trade in Canada, but significant improvements in inventory turnaround and general financial management cannot take place until enough booksellers and publishers adopt automated methods of improving administration. In the book trade, one of the problems appears to be the entry level costs of automation. Once installed, however, electronic means of communication between booksellers and publishers have been proven to be significantly cheaper than conventional methods. In addition, a strengthening of the distribution links between Canadian suppliers and vendors of printed materials can be viewed as absolutely essential if the Canadian book trade is to short-circuit the phenomenon of "buying around" - the practice of by-passing Canadian book suppliers and ordering direct from foreign wholesalers.

These examples are indicative of the potential economic stakes involved in the automation of cultural administration in Canada. The problems and the opportunities vary from discipline to discipline. However, the common denominator in all areas appears to be a lack of research and development funding and sources of expertise.

In mid-1984, the author was involved in the assessment and re-structuring of the Special Program of Cultural Initiatives. A number of observations made at that time serve as a useful summary of the specific problems highlighted in this paper.

Database development

Technology is already capable of linking numerous discrete databases in an "open system" information network. However, standard data gathering protocols, file structures and communications protocols will be required to maximize the effectiveness of database development within disciplines. Federal leadership and funding in this area will be crucial in ensuring an orderly and logical approach to this area of cultural technology. Inevitably, however, the question of ongoing support of these databases will have to be addressed, and federal support should be directed only to those projects with a reasonably good chance of being self-sustaining.

Network development

Both developmental and continuing maintenance costs for networks can involve significant expenditures, and departmental support should focus on providing adequate research, development and implementation funding to umbrella groups within disciplines to ensure that a rational approach is taken to the formation of intradisciplinary computer networks. As with database development, adequate attention should be paid to the possibility of cost recovery to help offset ongoing operating costs of maintaining the network.

Application development

In certain areas, it appears that research and development is needed to refine computer applications already in use in the cultural community or to experiment with new methods of delivering cultural services through the use of new technologies. ... For developmental projects with widespread application (such as boxoffice software), there should be a consensus within the cultural discipline as to the direction and emphasis of federal funding.

Technological orientation, training and support services

While the need for information technology within the cultural community is great, experience has shown that the need for information itself is greater. ...funding should be devoted to assisting cultural umbrella groups in educating their members about technology and its applications in a cultural milieu and in assisting them to implement these technological innovations within their operations. Even when automation has been introduced in an organization, there is an ongoing need for software support, training and systems maintenance and modification that is not, by and large, being adequately met by the private sector. ...funding should be made available, using mechanisms appropriate to individual disciplines or projects, to provide user support on a continuing basis, at least during the early stages of automation within a discipline or organization. Umbrella service orga-

> nizations, universities or the private sector are all potential sources of such expertise, but other mechanisms may develop naturally within specific disciplines or regions of the country. Therefore, ...assistance should be aimed at helping build these "bridges" between user and supplier.[27]

Faced with these facts, what course of action should the Department of Communications adopt to optimize the future for both the cultural sector and the communications/informatics industries?

---

27. Quoted in An Overview of the Cultural Initiatives Program, 1980-1985, Ottawa: Department of Communications Information Services, September 1985, pp. 17-19.

5. PROPOSED ACTIONS

The evidence would suggest, first of all, that a need exists to strengthen overall federal policies in the area of technology and culture. Since it has major responsibilities for both technology and culture, the Department of Communications should assume a leadership role to address some of the main research, development and information needs of the cultural community in the technological area. Several means of doing this are suggested in the sections below.

5.1 Leadership and Research

This paper has suggested the concept of "information" as one possible common ground where divergent cultural computing interests can be considered. This is hardly a new idea for the Department of Communications, having been explicitly articulated in a speech made some years ago by Pierre Juneau, when he was still the Deputy Minister of Communications:

> The Department of Communications is turning increasingly to the idea of a national information policy as a high growth component of a national industrial strategy. Such a policy would assure the coordinated development of hardware, communications and content; the collaboration of industry, labour and various levels of government; and the optimizing of our national position within the global market place.[28]

This policy concept has been revived in a somewhat modified form as the proposed DOC Informatics Task Force which is "to examine in consultation with government and private sector users and with informatics products and service providers the issues and options for industrial development, technology innovation, export promotion and improved technology diffusion in the Canadian economy.[29]

As part of its mandate, the Informatics Task Force is to develop a research program to define issues and design policy instruments. **One area that should receive explicit attention as part of this exercise is the cultural sector. This paper suggests that new technologies will play a potentially key role in improving both the economic and creative conditions of Canada's cultural community. Since the Minister of Communications holds responsibility for both communications and culture and since informatics policy will be a crucial element in the future well-being of both these sectors:**

1. **It is recommended that the proposed Informatics Task Force make provision for including respresentatives of the cultural sector among the "private sector users" and "informatics products and service providers" to be consulted in the development of future DOC strategies in this area.**

---

28. Quoted by Patrick Crawley, in "New technology and the future of the CBC", Cinema Canada, February 1985, p. 11.

29. DOC Strategic Priority Management Plan, August 1985.

2. **It is recommended that the Department of Communications take the necessary steps to introduce a clearing house of information on technological applications in culture and the arts to be made freely available, on request, to cultural organizations and individual artists seeking background documentation on current applications.**

One of the major complaints of the cultural community in the past has been a lack of information on successful and unsuccessful applications of new technologies in culture and the arts. The Department of Communications already possesses some information of this nature in the files of the Cultural Initiatives Program, (in the form of final reports on projects funded by the Program). Other responsibility areas, such as the Social Policy Directorate, also possess relevant material, and it is likely that other areas, such as the Broadcasting and Content Services Policy Branch and the Technology and Policy Assessment Branch, could contribute information. In addition, the databank could be fed by other sources as described in the recommendations below. A service of this nature need not involve significant resource expenditures. However, it would provide a critical focus at the federal level in support of policy development. The cultural community in general would also benefit from a databank of information not readily available from any other source.

3. **It is recommended that the Department of Communications, as part of its enhanced leadership role in this area, establish a technology and culture communications fund which would provide assistance to cultural groups wishing to organize workshops and conferences on the subject area. Assistance from this source should also be made available for the publication and dissemination of proceedings and reports emanating from these events.**

Ideally, a new fund should be established for this purpose. However, in recognition of the fact that new money may be difficult to obtain, such a communications fund might form part of the technology support provided by the Cultural Initiatives Program. Currently, support for technology and culture events can only be obtained under Component III of the Program which requires that the event have "national significance", i.e. involve participation from at least three provinces. Frequently, however, questions related to the introduction and application of new technologies in culture and the arts must be discussed at the regional or provincial level before national interests can be taken into consideration. (This is particularly true when decentralized networks or local training needs are at issue.) In most cases, the amounts of money involved are relatively small, but the potential benefits, in terms of increased information provision and dissemination, are great. In addition, support of a workshop, conference, publication, tape or other medium of communication under this fund could be made conditional on the deposit of a copy (or copies) of the final product in the DOC technology and culture information clearing house mentioned in recommendation 2 above.

4. **It is recommended that the Department of Communications take measures to improve access by cultural organizations to training funds or resources which would allow them to upgrade the technological expertise of existing personnel or to train new personnel in culture/technology applications.**

As indicated in the descriptions of particular applications included in this paper, the introduction of new technologies in culture and the arts leads to changes in both the number and the skill levels of personnel. For example, in the Waterloo-Wellington Museum Computer Network, women clerical workers hired with assistance from Employment and Immigration Canada for the Network pilot project not only acquired computer data management skills, but were later integrated into the staff of the participant museums at a higher skill level once the pilot phase of the Network had ended. (See Section 6.1.E.2) The Periodical Writers of Canada discovered that after automation of their national office, they could no longer utilize non-computer-literate support staff. PWAC must now choose between investing time and money in expensive training or hiring experienced people at salary levels up to 80 per cent higher than for non-skilled staff. (See Section 6.1.E.3) At the University of British Columbia library, the introduction of on-line search and electronic messaging systems in the Inter-Library Loan Division resulted in the upgrading of two non-professional library positions and the elimination of 25 hours per week of paid student labour.[30]

All of these experiences suggest that considerable sums of money will be required for technological skills upgrading of cultural personnel. Consideration should be given to providing for such funds within the CEIC Canadian Job Strategy Program, particularly since a commitment has been made within the context of this Program to increase the cultural sector's access to job training assistance. Two DOC objectives can be accomplished through this route: improvement of the return on human capital investment in the cultural field and improvement of informatics technology diffusion within Canadian society.

5. **It is further recommended that the Department of Communications establish mechanisms which will improve cultural access to research, development and investment funds for innovative projects involving communications and informatics technologies. Such projects might include long-term network and database development or specific applications such as improved box-office software, dance notation systems, computer imaging techniques or electronic publishing ventures on new media such as optical data disks.**

The case studies included in this paper have several common threads running through them:

1) As data exchange and information management becomes more important, increased emphasis must be placed on communications standards and protocols, database research and structuring, and network coordination resources. In most cases, both money and expertise are lacking to address these problems.

---

30. Anne B. Piternick, "Impact of Online Searching and Electronic Messaging Systems on Work Organization and Job Classification in the Inter-Library Loan Division," a paper presented at the Session on Inter-Library Loan and New Technology, Canadian Library Association Conference, 1985, p. 6.

2) Many private sector companies are eager to exploit the technology for creative and administrative purposes, particularly (but not exclusively) within the cultural industries. However, investment capital for this purpose is difficult to assemble because of the traditional reluctance of financial institutions to invest in cultural activities and the lack of public financing mechanisms which might act as levers for private support.

3) For the most part, the cultural community lacks the expertise to maximize technological benefits. Many software applications are designed for business users and require modification to meet the needs of non-profit cultural organizations. Many creators would also benefit from access to facilities and/or advice to perfect artistic applications of technology. Such expertise is rare and is usually too expensive for the average artist or cultural organization to consider.

A number of measures could be adopted to address these problems. The Department of Communications is currently examining and ressessing its in-house research function. This examination provides an opportunity to build support mechanisms for specific cultural concerns into a revised research mandate. In the past the National Library of Canada has worked in collaboration with departmental officials responsible for international liaison on Open System Interconnection (OSI) standards. Such collaboration has helped to make the NLC one of the world leaders in the testing and implementation of these networking standards (see Section 6.1.A). However, **a more formalized and broadly based mechanism for placing cultural computing issues on the agenda of departmental research priorities is needed and should be explored. This should include consideration of increased access by the cultural sector to both human and financial research resources currently resident within the Department.**

Another opportunity to address the research and development issues raised throughout this paper may emerge if the current proposal by the Minister to establish a Canadian Cultural Investment Bank (CCIB) is adopted. Part of the mandate of the proposed CCIB would be to provide financial assistance to key components of the cultural sector deemed to be of strategic importance for the development and growth of the Canadian cultural industries. One of the instruments at its disposal would be the provision of conventional and convertible loans and loan guarantees (in other words, venture capital) to projects in the cultural field which show promise of future economic pay-offs.[31] Several innovative applications of new technologies in culture and the arts now being developed by commercial firms may well have far-reaching productivity or economic implications. (These include the generalized protocol converter described in Section 6.1.A, the computerized ticketing system described in Section 6.3, the computerized lighting system outlined in Section 6.4 and the electronic publishing experiments described in Section 6.5.) Others will undoubtedly emerge, limited only by the imagination and interests of Canadian entrepreneurs.

---

31. Internal DOC files.

Past experience has shown that support for commercially-oriented culture/ technology initiatives is difficult to arrange through existing channels. The CCIC could therefore potentially play a key role in providing seed financing or leverage for promising projects which apply private sector technological "know how" to the problems of cultural delivery systems.

Another avenue to be explored as a source of support or expertise is some type of departmental partnership with the universities and other educational institutions. Many Canadian universities are recognized world leaders in such areas as computer imaging, computerized dance notation, and electronic music production, as well as in more generalized research such as computer system design, network communications and software development. **The Department of Communications should explore (perhaps as part of the re-examination of its research mandate) how university facilities, training resources and expertise might be made more accessible to the cultural community to help solve its computing problems.** For example departmental financial participation might form one part of a tri-partite partnership with industry and the universities to focus the efforts of specific facilities or personnel on both creative and administrative opportunities and problems in this area.

Section 6.5 describes how partnerships with the telecommunications industry, the educational community, publishers, oher cultural organizations and the private sector might produce content to revitalize the videotex industry and to take advantage of the opportunities emerging in optical storage technologies.

6. **It is recommended that money should be made more freely available for impact studies on the cultural organizations that have already automated and for the investigation of issues such as copyright and security of data in automated systems, particularly as these affect artists and cultural organizations. Basic statistical research should also be funded to determine the extent of current automation within specific disciplines (e.g. theatres, libraries) and future plans for the introduction of computerized systems.**

One of the main reasons why this paper has had to adopt a descriptive and selective approach to the issue of technology in culture and the arts is because comprehensive statistical data does not exist. The cultural field is automating rapidly, yet federal decision makers are unaware of the extent or the potential impact of this phenomenon, except in very general terms. Some preliminary attempts to gather such information have either been proposed (for example, "A Survey of Existing Automation in Canadian Libraries" in support of the implementation of the Payment for Public Use Program) or carried out (such as the Canadian Heritage Information Network's Report on the Survey of Collections Management Practices and the Use of Technology in Canadian Museums, 1984.). However, more effort needs to be directed to acquiring both quantitative and qualitative data on technology and culture, both for departmental policy purposes and for other users of the DOC information clearing house proposed in Recommendation 2.

Some of these studies should be funded under the Department's Strategic Reserve if they relate to specific priorities identified by the Minister and senior management. Alternatively, a greater proportion of the professional services budgets of relevant DOC responsibility centres should be allocated for this purpose. Finally, it may be possible to focus some of the resources of the Culture Statistics Program on this subject area.

5.2 Coordination and Cooperation

Arthur J. Cordell of the Science Council of Canada has observed that traditional boundaries between industries are beginning to blur and dissolve. What he has to say about the products of those industries could also easily apply to the subjects of this paper.

> Product fusion blurs distinct industry boundaries. Twenty years ago the telegraph, printing, travel, computer, mail, package delivery, airline, movie, and broadcasting industries were easy to distinguish. Now it is hard to tell them apart because their products and services overlap.[32]

The fact that libraries, bookstores and film researchers (as documented in Section 6.1) are already sharing the same types of information suggests that a strictly disciplinary approach to the issue of technology and culture is no longer possible nor desirable. Unfortunately, for the most part, funding agencies, users and suppliers are working in relative isolation from each other with little awareness of complementary or parallel developments in neighbouring agencies or disciplines. There are no guarantees that increased consultation will result in better development, but continued lack of information exchange will almost surely lead to wasted effort, at best, or costly duplication, at worst.

The Department of Communications should take a lead role in building "bridges" between the parties already involved in applying technological solutions to cultural problems. Actions should be taken at three levels:

1) Internally, within DOC
2) Internally, within the portfolio
3) Externally, outside the portfolio

5.2.1 Internal liaison

One concrete example of the type of internal liaison required relates to the functioning of the Department's University Research Program. In 1985, the Social Policy Directorate of the Department commissioned a study of DOC's communication technologies and cultural objectives with a view to outlining specific steps that the Cultural Affairs Sector could take to provide advice to the Research Sector on means of achieving the Department's cultural objectives.

---

32. Arthur J. Cordell, p. 65.

Traditionally, the cultural sector's access to University Research grants has been restricted to the socio-economic and cultural component of the Program. The study suggested that all components of the Program should be open to cultural clientele since many of the community's concerns, such as networking and communications standards, were technological as well as social.[33] This suggestion certainly ties in with the comment made under Recommendation 5 above regarding the need to place cultural computing needs on the agenda of the Department's research activities.

7. **The University Research Program is potentially a valuable tool in an overall strategy aimed at focussing and refining the Department of Communications' policies regarding the interface between technology and culture. It is therefore recommended that it be retained in the Department and restructured to permit greater cultural access to all components. As part of such a restructuring, the Cultural Affairs and Broadcasting Sector should be encouraged to make a greater effort to submit promising technology-related projects from each of the cultural disciplines to the appropriate components of the Program.**

More formal contact and liaison should also be encouraged between the Department's principal funding vehicle for culture and technology applications, the Cultural Initiatives Program, and other DOC responsibility centres possessing expertise in this and related areas.

8. **It is therefore recommended that the Cultural Initiatives Program set up more formal mechanisms of consultation with other responsibility centres within the Department regarding technology and culture projects submitted to it for funding. Such areas as the Technology and Policy Assessment Branch, the Social Policy Directorate, the Industry and Economic Development Branch, the Canadian Workplace Automation Research Centre and the Informatics Systems Research and Development Branch might be invited to participate. Not all this expertise need be brought to bear on each individual project, but regular round table sessions with representatives of all these groups might give CIP a broader contextual basis on which to make its funding recommendations and would help to provide the communications side of the Department with a clearer insight into cultural computing priorities and problems.**

5.2.2 Portfolio liaison

Casting the net a little further afield, there is a need to increase the dialogue between the Department and the federal cultural agencies on the subject of technology and culture. In the absence of a departmental focus for the issue, several agencies are proceeding at varying speeds with large-scale projects which may (a) possibly overlap and (b) have a long-term impact on the information-handling capacities of an entire cultural discipline. (See Sections 6.1.A, 6.1.B and 6.1.D)

---

33. CPER Management Consulting Inc., DOC Communication Technologies and Cultural Objectives, Ottawa: July 1985, p. 17.

9. It is therefore recommended that the Department of Communications establish an Advisory Committee on Technology in Culture and the Arts with representation from the Cultural Affairs and Broadcasting Sector, the Corporate Policy Sector, the Telecommunications and Technology Sector and each of the cultural agencies. While it is recognized that the Department cannot give direction to the agencies on the scope or implementation of individual initiatives, it is important for DOC to attempt to develop an overall federal consensus and strategy if it hopes to make the most of Canada's potential strengths and assets in the informatics field.

With specific reference to the needs of artists, there are some measures that the Department of Communications might take within the limitation of its mandate to improve access by creators to technology. Within the portfolio, there are two funding mechanisms that could work together to achieve this aim. They are the Canada Council's Integrated Media Program and DOC's Cultural Initiatives Program.

These programs tend to serve complementary functions with regard to culture and new technologies, with DOC handling mainly the administrative applications while the Council funds individual creators. However, in the past there has been some confusion about where the line between "creative" and "administrative" applications should be drawn. The result has been that some artists and arts groups have "fallen between the cracks" insofar as funding for creative projects is concerned. The most common problem is that the Canada Council's budget is too small to consider providing assistance for the purchase of computer hardware and software, but aid from the Cultural Initiatives Program is difficult to obtain under current criteria which give priority to the acquisition of equipment and software for management purposes only. There are obviously two possible solutions to this problem. Without considering at this stage the administrative difficulties involved:

10. It is recommended that <u>either</u>:

- **the budget of the Canada Council's Integrated Media Program be increased to permit larger grants to individual artists for creative projects, particularly for the purchase of required hardware and software;**

<u>or</u>

- **the criteria of the Cultural Initiatives Program be revised to permit arts organizations to apply for financial assistance to purchase computer hardware and software for creative purposes under the same terms as for equipment purchased for management purposes.**

The official attitude of the federal government to the support of creative artistic endeavour has been a "hands off" (or, if one prefers, "arm's length") one. The exceptions to this rule have generally arisen within the "producing" agencies such as the CBC, the NFB and the National Arts Centre, where a premium has undeniably been placed on nurturing creative expression within the "system". The general principle at work, whether within the

"arm's length" funding agencies or the producing agencies, has been the creation of a climate conducive to artistic expression. In the majority of cases, this "climate" can be translated into the simple issue of providing access to the means of artistic production.

In the absence of adequate funding to provide all interested artists with the latest in computer hardware and software, the Department of Communications should make the most of existing resources by bringing the artist to those centres willing to open the doors of their computer rooms. Section 7.4 describes how two federal agencies - the Canada Council and the National Museum of Science and Technology - have collaborated to launch an artist-in-residence program at the Museum. This approach could be generalized to take advantage of a solution which is flexible, highly visible and relatively cost-efficient. Therefore:

11. It is recommended that the Department of Communications investigate mechanisms (perhaps through the Advisory Committee proposed in Recommendation 9) whereby artist-in-residence programs could be established for Canadian artists working with new technologies. Possible sites for such residencies might include federal cultural agencies (for example, the National Museums of Canada, the NFB or the CBC), the Department of Communications itself (the Communications Research Centre), other federal departments and agencies (such as the National Research Council), postsecondary institutions (universities and colleges), private sector corporations (such as the private broadcast networks) and provincial government agencies (such as TV Ontario or Access Alberta).

5.2.3 External Liaison

The Department should also act to enlist the provinces, the universities and the private sector in a joint effort to address technology and culture issues. At the moment, the Department possesses little information on the extent of provincial involvement in this field, let alone a solid sense of their priorities for the future. Universities possess extensive expertise in both the socio-cultural and technological fields, and a number of them have participated in projects (such as the Waterloo - Wellington Museum Computer Network described in Section 6.1.E.2) which have had significant cultural impact. Within the private sector, there are certain companies (see particularly Sections 6.1.A, 6.3 and 6.4) which are eager to develop technology of direct benefit to the cultural community. In some cases, such as the partnership between the Canadian Heritage Information Network and Control Data Corporation (see Section 6.1.C), collaboration with the industry has produced impressive results. However, these joint ventures have generally "percolated up" under their own steam without any particular effort being made to encourage them.

Finally, we come to the cultural users themselves. The preceding sections have attempted to present a sense of their problems and priorities as reflected within the context of specific technological applications. As Dr. James R. Taylor observed in a recent address to the International Symposium on the Impact of New Information Technologies in the Workplace,

"There is no "office" (that's an abstraction), only a rich variety of workplaces and kinds of work."[34] This statement could apply to the "typical cultural user" as well.

This paper fully endorses Dr. Taylor's thesis that technology development in Canada should adopt a more "user-oriented" approach. His identified priorities for office technology research - "integrated operations in two languages, storage and retrieval of increasingly numerous and complex data bases and inter-organizational communications"[35] - could just as easily be applied to the needs of the cultural sector. And, when on the issue of standards, he states "that this is as much, or more, a social as a technical problem, ...one where the users have allowed their interests to be preempted by the producers"[36], he has zeroed in precisely on one of the emerging cultural dilemmas with regard to information technology.

As a first step in developing a consensus on possible common approaches to common problems, the Cultural Initiatives Program and the Social Policy Directorate, in conjunction with the Canadian Conference of the Arts, sponsored a national round-table discussion of cultural computing issues in April 1986. Participants included major national cultural service organizations, representatives from the Department of Communications and the federal cultural agencies, and experts from the private sector and the universities. This meeting suggested a number of directions for future action, including the need for the Department of Communications to take a more active part in establishing links between the cultural community and the computer industry and in co-ordinating its funding efforts with those of the provinces. Participants at this session also urged DOC to consider establishing an information clearinghouse on computers and cultural organizations and to provide funding, either itself or through Employment and Immigration Canada, for training and computer literacy programs for cultural personnel.

12. It is recommended that the Department of Communications utilize all the mechanisms suggested in the preceding recommendations as tools to enlist the provinces, the universities, the private sector and the national and provincial cultural service organizations in a concerted effort to address issues of particular concern to the cultural user community. These mechanisms might include (but are not necessarily limited) to the following:

a) further national meetings on specifically identified issues of concern;

b) exchange of information through the proposed DOC clearing house;

---

34. James R. Taylor, p. 16.

35. James R. Taylor, p. 17.

36. James R. Taylor, p. 18.

c) funding of workshops and conferences, either through existing programs or through the proposed technology and culture communications fund;

d) partnerships wth the universities and the information technology industry, perhaps as part of a revised research mandate for the Department or through the proposed Canadian Cultural Investment Bank;

e) studies and statistical research, perhaps funded under the Strategic Reserve, through existing DOC professional services budgets or the Culture Statistics Program;

f) funding under the Cultural Initiatives Program of specific proposals which provide the national or provincial cultural service organizations with the resources to tackle cultural computing problems at a cross-disciplinary or regional level;

g) more funding of provincial priorities in the cultural computing area through the Economic and Regional Development Agreements (ERDAS).

These recommendations should be viewed as beginning rather than end points in the departmental approach to the complex issue of technology in culture and the arts. It would be presumptuous to try to impose strategies or even make predictions when so much remains unknown about the subject area. However, this paper began with some thoughts on the importance of information as a cultural "by-product", and it is perhaps appropriate to quote a few more words on the subject, once again from the Science Council of Canada publication, The Uneasy Eighties, which serve to underline the theme as a potential guiding principle for the Department:

> Information as a basic resource shapes all other resources and affects all human activities. Economists have known for some time that information has one very interesting characteristic: it is not reduced or lessened by wider use or sharing - rather it appears to gain in the process of distribution and exchange. Although resources such as primary materials and energy are, by comparison, scarce and subject to depletion, information and knowledge are inexhaustible.[37]

These words hold hope and promise for the cultural sector which is one of the primary producers and distributors of information in Canada. With the advent of advanced information and communications technologies and an enlightened focus on the needs of both providers and users, Canada's cultural community may see the day when its product becomes a vital element of both the artistic and economic aspects of our national life.

---

37. Arthur J. Cordell, p. 134.

6. TECHNOLOGY AND THE "BUSINESS" OF CULTURE

In 1982-83, total expenditures on culture by all three levels of government - federal, provincial and municipal - was roughly $2.8 billion. During this period, Canadian consumers spent over $5.3 billion in the cultural marketplace or about $216 per man, woman and child.[38] Between 1971 and 1981, total labour force growth was 39 per cent, but the size of the arts and cultural work force increased by 74 per cent.[39]

Cultural lobbyists find that they must keep repeating these statistics to reinforce the impact of culture and the arts on the Canadian economy. This paper, too, must of necessity reiterate the point, if only to emphasize the potential extent of the technological transformation that is taking place. The "product" of culture may ultimately be information, but the "process" by which it reaches the consumer is very much dependent on the forces of the marketplace. One can believe, like Arthur J. Cordell of the Science Council of Canada, that "Information is the raw material of the new economy."[40] Or one can adopt the dominant philosophical position of the artistic community that "Artists do what they do with technology in spite of, not because of, the demands of capital to make a profit."[41] Acceptance of either position will still not allow one to ignore the huge cultural infrastructure that now exists in Canada to deliver the "product." This infrastructure, whether profit or non-profit oriented, is poised to automate both production and distribution on a widespread basis. Therefore, the following sections will survey what form this automation has taken so far and what this means in general terms for various types of cultural delivery systems and for the administrative aspects of culture and the arts.

6.1 Databases and Networks

The Treasury Board's Task Force on Informatics has observed that:

> The major change that is taking place in technology is a switch from large scale, batch processing, single user systems to a number of minicomputer-based networks, large interactive terminal-based networks or networks that include all sizes of computers as well as local work stations. Most organizations

---

38. The Canadian Conference of the Arts, The Role of the Arts and the Cultural Industries in the Canadian Economy, Ottawa, 1985, pp. 10 and 11.

39. Census Economic Characteristics, Census and Household Statistics, Statistics Canada as quoted in Canada Council, Selected Arts Research Statistics, 4th edition, September 1984, p. 36.

40. Cordell, p. 51

41. Chris Creighton-Kelly, "Artists, Technology and Cultural Production: How is Social Meaning Made?", Artists Talk About Technology, p. 25.

> today have the necessary capabilities for maintenance and production and for the most part, have not changed significantly over the last few years. The exception is the management of networks, now part of the Informatics function. The management of telecommunications networks and the preservation of integrity within these networks are additional activities, significant in scope This is an area of scarce expertise and staffing is difficult.[42]

Informatics, as defined by the Task Force, is "the electronic means used to collect, store, retrieve, produce, manipulate, display and disseminate information."[43] This function takes place in an environment increasingly characterized by the convergence of formerly separate technologies, namely data processing, telecommunications and office automation. According to the Task Force, major government departments and corporations in Canada are already in the process of integrating the responsibility for these technologies within their organizations, but it is proving to be a formidable task even for these well-endowed enterprises.[44]

Cultural organizations in Canada, with a few exceptions, are generally smaller and poorer than their counterparts in the business and governmental spheres. It is therefore somewhat surprising, at least at first glance, to discover that these organizations are already heavily involved in networking and the manipulation of large databases of information. However, as stated in the introduction to this paper, information is the raison d'être of most cultural enterprises, whether they are libraries, publishers, museums, archives, producers and distributors of audiovisual materials or recording companies. In a number of cases the federal government and its cultural agencies have taken the lead in setting up cultural databases and networks. But the beneficiaries and the day-to-day users have been small to medium-sized cultural organizations, most of which are responding to the challenges posed by the new technologies in enthusiastic and creative ways.

If big business and government are handicapped by the scarcity of network management resources and the high cost of integrating their information functions, these problems are even more acute in the cultural field. Development and implementation of large-scale electronic databases and networks has proceeded rapidly within the past ten years, but the cultural community has suffered from a chronic shortage of funds and the lack of a strategic overview when planning and implementing these systems within the various cultural disciplines. In many cases, linkage and coordination with

---

42. Task Force on Informatics, Organizational Trends in Informatics, Ottawa: Treasury Board of Canada, November 1984, p. 26.

43. Task Force on Informatics, p. 5.

44. Task Force on Informatics, p. 22.

complementary initiatives taking place in related fields has been weak or non-existent. This state of affairs is not necessarily deliberate, but reflects the enormous difficulty for any potential coordinating agency, such as the Department of Communications, of gaining an overview and developing policies in a rapidly changing environment.

As an initial step in defining the scope of database and network development, the following sections will outline some of the major projects that have been launched over the past few years under the aegis or with the help and encouragement of the Department of Communications and the federal cultural agencies.

A. Canadian Library and Information Network (CLIN)

Libraries came to the realization earlier than most other cultural organizations that the rapid and efficient manipulation and transmission of data was vital to the success of their future operations. Perhaps this has something to do with the libraries' traditional role as the repositories of human knowledge. Perhaps printed matter such as books and periodicals can be more readily perceived as information and data than other types of cultural products. Or perhaps librarians have been forced by necessity to adopt more rigorous and comprehensive methods of classifying and retrieving data than their colleagues in other cultural disciplines because the excuse that "we can't find it" is less acceptable to libraries' clientele than to seekers of film entertainment or visual art.

Libraries have not only been expected to manage large collections of printed matter (and, increasingly, of audio-visual materials), but also to know where to find a particular item if they do not have it on the premises. Therefore, the concept of a bibliographic network was already a reality well before automated systems were introduced in the field of library management. Computers began to be introduced in libraries in about the mid-1950s but these machines were large, slow, expensive and certainly not "user friendly". It was not until the 1970s that technological advances in microelectronics and telecommunications brought about a situation where, theoretically at least, libraries could acquire small, cheap, interactive computer terminals capable of communicating data over long distances. In actual practice, an electronic tower of Babel was coming into existence. Computers were incompatible, and data was being collected in a variety of different formats which rendered communication extremely difficult.[45]

In 1975, the National Library of Canada (NLC) introduced the DOBIS system to maintain an integrated, on-line national database consisting of Canadian union catalogue files, source files from the NLC and from national

---

45. National Library of Canada, Linking: Today's Libraries, Tomorrow's Technologies, (Canadian network papers; no. 7), Ottawa: National Library of Canada, March 1984, p. 5.

bibliographic agencies in other countries. This system was also intended to provide a bilingual, shared cataloguing system for federal government libraries. (Currently, the system supports over three million records, seventeen cataloguing participants and over 100 search-only customers.)[46] While DOBIS formed a major element of the library information system, it was by no means the only source. Bibliographic records also existed on UTLAS (a large bibliographic utility now owned by Thomson International) and on various provincial/regional systems. By 1979, the NLC had concluded that a decentralized bibliographic network represented the only option for a country such as Canada where both information and libraries were geographically dispersed and managed by a wide variety of private and public sector interests. Having rejected the concept of a centralized network as unworkable, the National Library proposed that it:

(a) develop in cooperation with other institutions managing bibliographic centres, a decentralized bibliographic network with a view to ensuring the fullest sharing of information and library materials in the most cost-effective manner by Canadians anywhere;

(b) fund research and development studies and pilot projects, prerequisite to the effective development of the proposed nationwide network;

(c) promote the extension to other fields of the on-line information retrieval services provided by the CAN/OLE system, and the development of the system to provide access to other important data banks maintained by other institutions in Canada;

(d) establish the appropriate network management and governance boards and committees to ensure that the network will function in a cost-effective manner by developing and following common procedures.[47]

In 1981, the NLC's Office for Network Development was formed. Its major task at the time was to coordinate the participation of sixteen Canadian libraries in the iNet field trial organized by Telecom Canada. This field trial was designed to determine whether a decentralized national library and information network was feasible within the existing and fragmented library environment. Conceptually, it was based on the Open Systems Interconnection (OSI) Reference Model, a series of standards developed by the International Organization for Standardization (ISO) to facilitate computer-to-computer and computer-to-terminal data interchange.

---

46. Cynthia J. Durance, "Exploiting Technology to Build a Canadian Library and Information Network", a paper presented to the IFLA General Conference in Chicago, 1985, p. 1.

47. National Library of Canada, The future of the National Library of Canada/L'avenir de la Bibliothèque nationale, Ottawa: National Library of Canada, 1979, p.p. viii - ix.

The OSI model is complex, but independent of hardware and software. The computer system's architecture is divided into seven layers with standards or protocols being developed for each layer of the model. The bottom six layers - the physical, link, network, transport, session and presentation layers are independent of the data being transmitted. Only the top layer, the applications layer, requires protocols designed specifically for each type of data transfer. Fortunately, the telecommunications common carriers are committed to introducing OSI standard protocols for the lower four layers as they become available. This has allowed the NLC to concentrate its efforts on developing protocols for the upper applications layers.[48]

The iNet field trial, which took place between July 1982 and July 1983, was one of the first (if not the first) attempts in the world to test the OSI concept. It has been meticulously documented and evaluated[49] and has confirmed the NLC's conviction that OSI should form the basis of any future decentralized library and information network.

Since 1983, the National Library has adopted a four-pronged approach to the development of a decentralized bibliographic network:

(1) technical research and development of application level protocols;

(2) pilot projects involving a variety of types and sizes of libraries and other organizations (such as book publishers) to test the software and protocols developed under (1);

(3) dissemination of the resulting products through licensing agreements with other cultural organizations or private sector companies;

(4) creation of various bodies to disseminate information about the network and to coordinate network policies and services.

These bodies include:

(a) the Bibliographic and Communications Network Committee which deals with network policies, copyright and ownership issues, telecommunications regulatory issues, contracts, licensing of protocols and software, database service charges, etc.;

---

48. Cynthia J. Durance, p.p. 8-9. The description of the OSI concept has been extremely simplified for general consumption. For a more complete treatment of the subject, the reader should consult A Guide to Open Systems Interconnection, Ottawa: Government of Canada Information Technology Bulletin GES/NGI-20/G, 1982.

49. See National Library of Canada's Linking: Today's Libraries, Tomorrow's Technologies, reference footnote #30.

(b) the Resource Network Committee which is concerned with resource sharing within the network;

(c) the Committee on Bibliography and Information Services for the Social Sciences and Humanities which seeks to foster the creation of Canadian bibliography, reference works and machine readable databases in these subject areas;

(d) the Task Group on Protocols which provides direction on technical development;

(e) the Canadian Committee on Cataloguing which is responsible for setting bibliographic standards for Canadian libraries;

(f) the Canadian Committee on MARC (Machine - Readable Cataloguing) which is responsible for revisions to the Canadian MARC format.[50]

Over the past five years, the National Library has dedicated 54 person years and over $5 million to the development of a Canadian Library and Information Network (CLIN). From August 1984 to October 1985 it conducted a second pilot project to evaluate the impact of new technology on four key areas of library operations in a network environment - interlibrary lending, acquisitions (book orders), file transfer and network directory services. The preliminary results of this evaluation confirm that the NLC's decision to devote significant energy and resources to the networking issue has not been misdirected.

A.1 Inter-Library Lending (ILL)

Canadian libraries currently make over 1,000,000 requests each year for material from each other's collections. One of the protocols developed under the CLIN pilot project allows users to exchange electronic messages regarding ILL requests - such as overdue notices, cancellations, recall notices, and requests to extend the due date of an already-existing loan.[51] Ten libraries participated in a pilot project to test this protocol, which essentially provides a "gateway" to permit ILL exchanges among diverse computers. Although this standard has not yet been widely adopted by libraries and commercial vendors, it could have a significant impact on the numbers of loan requests forwarded to major libraries, including the NLC.[52]

---

50. Cynthia J. Durance, pp. 8-22.

51. Cynthia J. Durance, p. 13.

52. Information derived from a proposal by the National Library dated October 30, 1985.

Independent research on ILL confirms this conclusion. A study carried out by the University of British Columbia indicated that between 1983-84 and 1984-85, the number of ILL messages transmitted by telex to the National Library declined by 45 per cent - from 64,230 to 35,450. During the same period, electronic mail ILL requests increased by 66 per cent - from 35,354 to 58,596.[53] A survey of 28 major Canadian research libraries in 1985 indicated that only five were using electronic mail to transmit ILL requests in 1981. By 1985, 23 of these libraries were using electronic mail for this purpose, usually at a very high rate.[54]

A.2 Acquisitions (Book Orders)

The similarities between ILL and acquisition of books, as we move into the electronic messaging age, are increasing. A protocol now under development by the NLC and scheduled for testing in 1986 is designed to transmit purchase orders, returns and claims from libraries to publishers, and to allow publishers and booksellers to provide machine-readable invoices and status reports in return.[55] Like ILL, acquisitions can be transmitted via electronic mail, but the pilot project evaluation concluded that it is essential for the CLIN acquisition system to be compatible with electronic ordering systems currently under development by Canadian publishers and booksellers. (See sub-section 6.1.B on the Canadian Telebook Agency below.)

The major difficulty with this area of development lies in the fact that libraries are only a portion of the customer base for Canadian publishers. While both the library and the publishing communities believe it is important to have common automated links, publishers are not enthusiastic about the possibility of having to maintain several protocols to link with different portions of their clientele. The Canadian Telebook Agency has adopted the electronic mail messaging format or protocol already in use by CLIN, but whether individual publishers and booksellers will be willing to adopt OSI messaging and acquisition standards as they become available is less certain.[56] This situation could conceivably have implications for cultural sovereignty because if Canadian publishers and booksellers do not

---

53. Anne B. Piternick, "Impact of Online Searching and Electronic Messaging Systems on Work Organization and Job Classification in the Interlibrary Loan Division," a paper presented at the Session on Inter-Library Loan and New Technology, Canadian Library Association Conference, 1985, p. 3.

54. Anne B. Piternick, p. 10.

55. Cynthia J. Durance, pp. 14-15.

56. Sources of this information are the NLC proposal dated October 30, 1985 and "The Canadian Telebook Agency: A Discussion Paper", an undated document produced by the Canadian Telebook Agency and acquired from DOC files.

adopt the international standards currently being introduced in the library community, libraries may increasingly by-pass them to order directly from U.S. sources which adhere to an acceptable, if limited, OSI layer 7 (applications layer) protocol. The evaluation of the NLC's second pilot project has emphasized the need for ongoing consultation and coordination with the book trade to ensure maximum benefits for both the Canadian library and publishing communities. The success of this cooperation may well depend on the NLC's ability to develop an acquisitions protocol that is clearly superior to those in use elsewhere, as well as on the book trade's willingness to automate according to certain uniform standards.

A.3 File Transfer

The NLC is also working on so-called "generic" protocols which would allow users to search for cataloguing records on remote databases (such as DOBIS) and then to transfer these records electronically to their own systems for use in cataloguing their collections or in arranging for interlibrary loans or acquisitions. File transfers of this nature could potentially save libraries a good deal of time and money now spent on producing machine readable records in-house or transferring information from microfiche to some other medium.[57]

Canadian libraries now maintain over 20 million machine-readable bibliographic records on their collections, although these records are kept on a variety of systems. An initial evaluation of the file transfer protocol indicates that electronic exchange of cataloguing information is likely to increase dramatically once libraries have access to a tool which will permit easy access to multiple databases and problem free transfer of information from them.[58] It is expected that the highest demands will initially be placed on the major bibliographic information providers such as the National Library's DOBIS system and the UTLAS bibliographic utility. However, in a decentralized network such as CLIN, the potential exists for the exchange of files among all participants. As more and more libraries automate their cataloguing operations, a large and potentially lucrative market for the multilateral exchange of bibliographic data could develop, provided that issues such as network control and billing procedures can be resolved.[59]

The complexities of file transfer within an open systems environment have prompted some bold and possibly globally significant research within Canada. Cognos Incorporated, a Canadian software development company, has recently been awarded a contract under the Unsolicited Proposals Program of the Department of Supply and Services to develop a generalized protocol

---

57. Cynthia J. Durance, pp. 15-16.

58. NLC proposal, October 30, 1985.

59. Linking Today's Libraries, Tomorrow's Technologies, pp. 34-5.

converter for the National Library of Canada. The initial application for this converter would be to load foreign information on new books into the NLC's DOBIS computer. DOBIS will only accept information in the CANMARC (Canadian Machine-Readable Cataloguing) format, but foreign book information arrives in a variety of formats, including UNIMARC, UKMARC and USMARC. It is essentially a case of everyone collecting roughly the same information but in a variety of different ways. Rather than insisting that everyone follow the same rules (a virtually impossible task anyway within today's information processing environment), the generalized protocol converter would have the ability to infer, from information stored within the system, the correct procedure to follow to convert data from one format to another.

This may sound simple but as anyone who has ever used an automated system, knows, computers have no reasoning ability of their own. The development of an inferencing generalized protocol converter involves aspects of advanced technology research commonly referred to as artificial intelligence. If the Cognos project is successful, it will have wide applications beyond the library community. Organizations wishing to convert data from one format to another will no longer need to write programs describing in agonizing detail the conversion rules required to move data from System A to System B. All they will have to do is load the input and output formats for as many systems as they are using, then let the converter rewrite the data from source to target.[60] Obviously, this is more than an ordinary "black box" and would put both Canada and the Canadian library community in the forefront of international systems development in the information processing field.

A.4 Network Directory Services

For anyone searching for information in a traditional library setting, the first stop is usually the cataloguing index. In an automated network environment, the equivalent of the cataloguing index will be the network directory. The network directory will inform users what databases and services are available to them, the terms and conditions of their use, their hours of service, and how to get help if problems develop. The NLC is currently developing a model for a protocol to provide directory services, but implementation of this function is still some time away.[61]

---

60. The information in the previous two paragraphs is proprietary, having been obtained from Cognos Incorporated's "Unsolicited Proposal to the Science and Professional Services Directorate, Supply and Services Canada for a MARC Format Converter", Proposal number P-3339-P, July 4, 1985, pp. 6-14.

61. Cynthia J. Durance, p. 16.

A.5 Future Plans

The National Library recently received Cabinet approval for the resources required to establish the Canadian Library and Information Network on a permanent basis. An initiative of this scope and complexity will not come cheaply: it is estimated that at least $4 million and 35 person years will be required in each of the fiscal years from 1986-87 to 1988-89 to develop, coordinate and support library and information networking in Canada.[62] On the other hand, the expenditure of these resources must be viewed within the context of the current library environment which includes approximately 5,000 libraries with operating budgets totalling over $900 million annually. It has been estimated that $1 billion a year is now being spent retrieving information from electronic libraries and that this sum is growing by 30 per cent a year. Information now has a higher monetary value than many "traditional" commodities, particularly in the scientific and technical fields, and electronic libraries can already provide access to over 40 million articles indexed within various bibliographic systems.[63]

The Canadian Library and Information System is perhaps the most crucial element within the emerging culture and technology field because it has been the trail-blazer within the cultural community in areas ranging from Open Systems Interconnection to information resource sharing on a vast scale. It has been treated at length in this paper not only because of its technological innovations but also because of its strategic position at the crux of the information/culture interface. At the moment, it is impossible to project the potential economic benefits Canada could derive from the information society. One source has predicted that the creation of special interest computer networks could generate ten times the employment and revenue now derived from all the special interest magazines that have sprung up over the past decade. (By "special interest", the author means networks devoted to such subjects as opera, poetry and heritage buildings.)[64] Cultural organizations have already eagerly embraced the technology, and the cultural community has both the human resources and the creativity to undertake the information provider role. There are innumerable technical, legal and policy issues to be resolved, but the libraries, given a chance, could prepare the way for the other cultural disciplines.

B. Canadian Telebook Agency (CTA)

As mentioned in section A above, the Canadian book trade has also been active in developing a database and communications network designed to promote the purchase of English language books from Canadian vendors. This initiative is the Canadian Telebook Agency (CTA), a non-profit organization established in 1981 by the Association of Canadian Publishers, the Canadian Book Publishers' Council and the Canadian Booksellers Association to help counteract a growing trend to "buy around" Canadian book suppliers by going directly to foreign wholesalers.

---

62. NLC proposal, October 30, 1985.

63. Arthur J. Cordell, p. 59.

64. Arthur J. Cordell, p. 57.

Since 1982, the CTA has received nearly $600,000 from the Department of Communications to accomplish a number of objectives, including:

(a) the establishment and maintenance of an up-to-date database of information on English-language trade and college/university text books available from Canadian sources;

(b) the distribution of this information to subscribers through microfiche and through on-line computer access;

(c) the development and implementation of a Canadian Teleordering Service to collect via telecommunications or machine-readable batch input (ie. computer tapes) orders from users for any title on the CTA database and forward such orders to the appropriate Canadian source; and

(d) the development and implementation of a hardware and software package for a fully automated bookstore environment, ensuring that this package remains compatible with publisher, agency and wholesaler systems as they evolve over time.[65]

In the book trade, no less than in other businesses, complete and accurate information is the key to success. Part of the problem with "buying around" rested in the fact that better information on book titles and their vendors was being provided by foreign-based wholesalers and publishers (particularly American ones) as a result of their superior use of new technologies. The CTA database come into existence as a response to this problem. It currently includes more than 250,000 titles marketed by over 170 vendors representing 2,000 international and 400 Canadian publishers. The data is updated monthly and is available on microfiche to the CTA's 400 subscribers. In addition, a copy of this database is resident on the UTLAS bibliographic utility system, which means that it can potentially be accessed on-line by over 1,000 libraries. The CTA's primary customers are the members of the Canadian Booksellers Association, the majority of whom are independent bookstores. However, the major chain bookstores (such as Coles and W.H. Smith), the major department stores, nine of the 50 independent book wholesalers and over 50 Canadian libraries are also clients.[66]

---

65. Peat Marwick, Canadian Telebook Agency: A Review of Book Industry Communications Standards/Protocols and Software Strategies, Toronto: Peat, Marwick and Partners, November 1984, p.p. II-2, II-3.

66. Canadian Telebook Agency: A Discussion Paper, an undated document obtained from DOC files, p.1 and p.6.

While the database of book titles represents the heart of the CTA's operations, the networking aspect of its service is the circulatory system through which this information reaches its users. In its early years, the CTA relied on the telephone as a vehicle for accepting orders from bookstores. In May 1985 however, it introduced the TELEBOOK network, an electronic ordering service which allows bookstores to send purchase requests 24 hours a day through Telecom Canada's Envoy 100 electronic mail system. Each subscriber with access to a modem-equipped microcomputer is assigned an electronic mailbox which can be used to transmit purchase orders and to send and receive messages. Once the CTA receives a purchase order from a client, it assumes the role of distributor, guaranteeing that the order will reach the appropriate vendor within 24 hours. In addition to the electronic mail service, the CTA also accepts bulk (or batch) purchase orders on standardized computer tapes - a service used primarily by large computerized buyers such as chain bookstores whose high volumes make electronic transmission impractical.[67] The chief advantages of such a system lie in the standardized order format and the automated processing of requests which produce uniform, "clean" data, cutting down on both the amount of time a publisher spends filling an order and on the number of returns made by customers.[68]

Subscribers to the CTA's service can purchase the full package of hardware and software (which includes an IBM PC microcomputer, 256K of memory, telecommunications and Telebook purchase order software) for about $4,000. The Telebook order acceptance processing and transmission service costs an additional $45 a month, exclusive of telecommunications costs, and is meant to function on a user-pay basis. Expenses for 1985 were projected to be $550,000, offset by $575,000 in revenues.[69] In actual fact, there has been a $265,000 shortfall in revenues which has been covered by the 178 vendors who list their products on the database. As of November 1985, 31 bookstores were using the Telebook purchasing service. The CTA predicted that at least 55 bookstores would be participating by March 1986, and it is optimistic that the figure will be over 90 by the end of 1986.[70]

The Telebook service is considered by the CTA to be only the first step toward a fully-automated bookstore and, in its official mission statement, the agency indicated that it intended to develop and test software for inventory control, sales analysis and forecasting, credit and financial management, word processing, point-of-sale transactions, information retrieval and advertising/merchandising which would be tailored to the

---

67. Telebook, a promotional brochure distributed by the Canadian Telebook Agency.

68. The Canadian Telebook Agency: A Discussion Paper, p. 11.

69. Serge Lavoie, " Buying into future technology - can our industry afford it?", The Canadian Bookseller, February 1985, p. 7.

70. Author's conversation with Robert Baird, Executive Director of the Canadian Telebook Agency, December 16, 1985.

needs of retail bookstores.[71] What has actually occurred is the realization that off-the-shelf software specifically aimed at the bookstore market already exists. In view of the high cost of software development, the CTA has instead tested and endorsed software produced by two American companies for use by Canadian bookstores.[72] While the chain bookstores have achieved a significant degree of automation, computer technology has been introduced only in about 30 to 40 per cent of college and university bookstores and 10 per cent of independent bookstores.[73] The CTA's advice to its clientele is intended to ensure that automation proceeds in an orderly fashion according to the needs and priorities of the Canadian book trade. Eventually, it hopes to form a Canadian equivalent to the American Book Industry Systems Advisory Committee (BISAC) to set standards within the industry on the use of new and emerging technologies such as electronic messaging.

Progress toward the Telebook service has not been without its problems. Chief among them, as discussed in the preceding section on the National Library's CLIN initiative, has been the question of acquisition messaging protocols. During the course of its development of Telebook, the CTA was approached by the National Library and informed of the similar work taking place in the library sector to develop library acquisition protocols. A study was commissioned to review the issue and to make recommendations on the direction the CTA should take to ensure that Telebook was not at odds with either the NLC's protocol or the International Standards Organization's OSI-related development work on acquisitions standards for the worldwide bibliographic community.[74]

One of the findings of the study was that there were major differences between the file structures of purchase orders made by libraries as compared to purchase orders made by booksellers. In a non-automated environment such differences do not matter, but once automation is introduced, data formats must be compatible or extra money must be spent by the recipient of such information to convert it to some standard configuration that can be processed by his computer. In this case, a compromise was reached, and Telebook was able to adopt the NLC's messaging protocols for electronic mail transfer of acquisitions data. Telebook is also committed to participation in the NLC's proposed 1986 pilot project to test an enhanced

---

71. Peat Marwick, Appendix A, p. 4.

72. Conversation with Robert Baird, December 16, 1985.

73. Estimates provided by Robert Baird of the CTA.

74. This was the Peat Marwick study referred to in footnote #50. An extensive discussion of the options for bibliographic data interchange of purchase order/acquisition information is included in Section III of Peat Marwick's final report.

acquisitions messaging protocol which would allow for the exchange of additional messages such as exception reports back from the vendor to the purchaser regarding order problems.[75]

During its pilot trial of Telebook in 1984, the CTA also discovered that providing on-line access to its database was not as simple and straightforward as had been anticipated. The first problem was that users had to search the database on a service bureau computer using Datapac (one form of telecommunications between computers) but switch over to Envoy 100 (another transmission mode) to send a purchase order to the CTA's own computer. This procedure was not only inconvenient but also inefficient because any information obtained during a search had to be transcribed on paper and re-entered on the Envoy 100 purchase order system.[76] A second problem was the high telecommunications costs of on-line searching. A third was the low accuracy of some title data provided by publishers which made on-line searching somewhat unreliable. At present, the CTA does not offer on-line access to its database, although it is exploring the feasibility of acquiring its own supermicrocomputer and repatriating its information from the service bureau. Once it has direct control over the database and can exercise quality control over its contents, the CTA would like to investigate the possibility of offering at least a limited form of on-line search capability.[77]

There is currently no electronic purchasing service equivalent to Telebook operating in the French language book market, although a commercial firm called Bibliodata has been providing a microfiche database listing all Canadian French-language books for the past five years. The CTA has worked with Bibliodata in the past to develop its own database and would like to see a French-language version of Telebook serving that portion of the Canadian market. However, the Quebec book industry has not yet agreed on whether such a service should be run on a commercial basis by a firm such as Bibliodata or whether an industry-wide non-profit cooperative based on the CTA model should provide the vehicle. In either case, the CTA is prepared to work with the French-language book trade to ensure compatibility of standards.[78]

The Telebook service is a good illustration of the typical course of development for a cultural database and network. It is industry-specific and has undertaken a phased approach to the provision of its services, primarily because of the enormous problems involved in trying to do too much too soon. At the same time, it has discovered that it cannot develop

---

75. Information provided by Robert Baird, December 16, 1985.

76. Peat Marwick, p.p. IV-4, IV-5.

77. Conversation with Robert Baird and The Canadian Telebook Agency: A Discussion Paper, p. 18.

78. Conversation with Robert Baird, December 16, 1985.

in isolation from related cultural sectors and, once having made this discovery, it has been able to benefit extensively from the work already done elsewhere.

Moving from the general to the specific, the CTA views itself as being on the threshold of a movement which holds considerable promise for the future of the Canadian book trade. It is convinced that many of the financial problems of Canadian bookstores are the result of low inventory turnover (currently about three times a year when six to eight times a year would be optimal) and distribution inefficiencies (slow order fulfillment and high rate of returns). Automation could provide the key to gaining greater control over inventory and general financial management, but the real benefits will not become evident until the technology has been adopted by greater numbers of bookstores and publishers. Currently, only 31 bookstores are using the Telebook electronic purchase order service and only 13 publishers are accepting purchase orders transmitted by Telebook via electronic mail. Telebook's pilot project showed that the cost of electronic mail transmission could be anywhere from $100 to $160 a month cheaper than using courier services to transmit purchase orders, depending on volume.[79] For these benefits to become significant, however, greater volumes of traffic have to be generated, and more bookstores and publishers must have access to computer technology for management purposes.

One measure which the CTA would like to see is additional financing from governments, perhaps in the form of loans, for the automation of retail bookstores and small and medium-sized publishers.[80] It should also be noted that standards for data exchange of all kinds are likely to become a growing priority, and governmental support for research, development and testing will be needed if chaos is to be avoided.

C. Canadian Heritage Information Network (CHIN)

C.1 The Past

Like librarians, museum professionals have always been faced with the challenge of managing and retrieving large collections. However, unlike the library field, the objects of museological attention are not books but "early Matisse and Picasso, dinosaurs, human stool, bags of sand and all the possible condiments that could make up a museum collection."[81] Traditionally, documentation on museum collections (without which many would be simply useless accumulations of undecipherable objects) has been

---

79. The Canadian Telebook Agency: A Discussion Paper, p. 19.

80. Conversation with Robert Baird, December 16, 1985.

81. Ross Rogers, "A CHIN above the rest," Ottawa Magazine, March 1984, p. 11.

maintained in manual card files and ledgers. Large amounts of clerical time were required to maintain these files and even if they could be kept up-to-date, extracting statistical information for research or curatorial purposes was an unwieldy and time-consuming task.

The realization that this was a field ripe for computerization was slow in coming. Indeed, the Government of Canada showed considerable foresight and initiative in 1972 when the then Secretary of State, Gérard Pelletier, announced the intention to create a national inventory of the cultural and scientific collections held in public institutions.[82] At that time, nobody had a very clear idea of the potential size of this undertaking, although it was estimated that 35 million objects might be involved. Nevertheless, officials of the National Museums of Canada, who were put in charge of the project, were instructed to amass this information "as quickly as possible and to provide access...through a computerized information retrieval system."[83] Thus, the National Inventory Programme (NIP) was born in 1975.

The original idea behind NIP was to provide museums with direct access to information on their own collections and on the collections housed in other museums through computer terminals linked to a central computer in Ottawa. With improved access would come an end to the isolation among museums that had prevented tham from knowing what was in each others collections. Knowledge would be shared, and exhibition planning, loans, education and research would all be improved as a result.[84]

This laudable objective has continued to govern the National Inventory Programme and its successor, the Canadian Heritage Information Network (CHIN) to the present day. However, computer technology in 1972 was still very much dominated by the centralized data processing model. The National Inventory Programme made some initial assumptions about the nature of museum collections which, coupled with the limitations of the technology, led to serious problems.

The three assumptions upon which NIP was based were that:

1) documentation of museum collections was fairly consistent, at least in the larger institutions;

2) this documentation was relatively stable and would not require frequent updating: most new documentation would relate to new accessions;

---

82. Peter S. Homulos, "The Canadian National Inventory Programme: 1972-1977", October, 1977, p. 1.

83. Peter S. Homulos, p. 1.

84. Peter S. Homulos, p. 1.

3) although there were no accepted standards for collections documentation, the documentation of similar objects in different museums would be compatible enough to allow records to be stored and processed in a common data bank.[85]

As was soon discovered, collections information is far from stable. Certain artistic, cultural or scientific aspects of an artifact remain relatively fixed over time, but other parts of the record dealing with physical location, exhibit history, conservation information or insurance value may require frequent updating. The NIP computer system consisted of two separate parts: a data entry module and an information retrieval module. These modules existed on separate computers and, while information could be retrieved rapidly if a complete record existed on the information retrieval module, data entry (including corrections and updates) could only be done slowly and fed into the retrieval system in batches every few months.[86]

Such a situation proved frustrating to users, who turned out to be just as interested in the possibility of using the computer for the day-to-day drudgery of collections management as for exchanging information instantaneously with their colleagues. One user at the National Museum of Man, charged with the management of 34,000 archeological artifacts, pointed out that delays in updating records could be more than simply inconvenient.

> Inaccuracy in documentation could prove catastrophic for a construction company depending on information on the location of an archeological site...They might be mid-bulldozing before they've even discovered they've unearthed an Indian graveyard. Updating valuable records then, involved a two-year turnaround, and in that length of time...damage to a precious site could be irreparable.[87]

With regard to the problem of document turnaround time, NIP found itself the victim of a curious phenomenon that might be termed "computer-enhanced expectations". Museums had existed for years with cumbersome manual systems and had endured them without complaint. However, as the Director of the Programme observed:

> In the absence of a computer system, the manual systems in use were considered adequate; given the enormous task involved in updating a set of records and all the corresponding cross-references, indeed the documentation remained stable...It was

---

85. Peter S. Homulos, p. 2.

86. Peter S. Homulos, p. 5.

87. Ross Rogers, p. 30.

> only when museum professionals became aware of the possibilities afforded to them by such a computer system that they began to increase their demands for more flexible and rapid service.[88]

NIP was not completely wrong about its third assumption: museum professionals did tend to record the same types of information about similar artifacts. The problem was that they used differing terminology and varying degrees of detail in the process. The Director of NIP may therefore have been indulging in understatement when he said in 1977 that, "The operation of an effective information retrieval system without the use of standard classification systems or of standard vocabularies is, to say the least, difficult."[89] NIP had developed a system for converting this variety of information into a standard format and for searching for synonyms or logical word groupings, but it became evident as time passed that greater effort would be required to encourage the use of precise language in museum documentation.

In 1981, the National Museums of Canada completed a review of NIP and concluded that the original objective of information sharing was solid, but that more advanced computer technology was required to assist the Canadian Museum Community with the daily management of collections.[90] At that point in time, 150 museums had databases on the system totalling approximately 1.5 million records.

It might be said that the Canadian museum community was an indirect beneficiary of the Soviet invasion of Afghanistan. Control Data Corporation had been working on a project to computerize the records of about 2.5 million artifacts in the Hermitage Museum in Leningrad when the invasion came and the U.S. placed an embargo on strategic technology exports to the U.S.S.R. This event coincided roughly with NMC's decision to upgrade the NIP system. Control Data was therefore looking for a new customer and after some negotiation, several technical studies and an extensive pilot project, the NMC entered into an agreement with the company to develop the computer hardware and software required to solve NIP's problems.[91]

In September 1982, the National Museums of Canada announced a name change and a revised policy for NIP, which retained the original mandate to share information and create a national inventory of collections but also added provisions to offer a collections management service to client institutions and to provide advisory services to the Canadian museum community on the

---

88. Peter S. Homulos, pp. 5-6.

89. Peter S. Homulos, p. 8.

90. Canadian Heritage Information Network, a short paper issued by CHIN on August 10, 1984, p. 3.

91. Canadian Heritage Information System, p. 2.

introduction of new technologies for management information purposes.[92] The National Inventory Program became the Canadian Heritage Information Network (CHIN) and with the help of the powerful new tools developed in conjunction with Control Data, the NMC proceeded to refine its computerized documentation services to reflect more closely the needs and priorities of its clientele.

C.2 The Present

In 1982, a Cyber 170, Model 720 mainframe computer capable of supporting 180 terminals was installed at CHIN headquarters in Ottawa. This system houses the PARIS (Pictorial and Artifact Retrieval and Information System) Software, originally developed by Control Data for use at the Hermitage, which is capable of performing both the data entry and information retrieval functions simultaneously and on-line to the user.[93]

The CHIN database has also been restructured to make it more useful for multidisciplinary searching. Originally, the database was divided by discipline with each separate area such as botany or fine arts consisting of records designed specifically for that discipline. To make the retrieval of data easier and more efficient it was decided to combine these disparate sets of records into two databases - one on the humanities and one on the natural sciences. At the same time, the number of fields was expanded greatly so that it is now possible to record 669 types of information about a specific humanities artifact or 676 types on a natural sciences one. In March 1985 CHIN produced two massive bilingual data dictionaries for the humanities and the natural sciences designed to explain each field in use and to assist users with information entry and retrieval. The dictionaries are mechanisms which promote the sharing of information by ensuring that similar types of information is placed in the same field by all users.[94]

As with NIP, the CHIN system allows each institutional user to maintain its own private PARIS database consisting of all its records and documents organized as humanities or natural sciences collections (or both in the case of large institutions.) Only the institution that owns the data has full access to all the records and to all fields on each record. To fulfill its obligation to promote information sharing, CHIN is currently in the process of setting up two National Data Bases, one for the humanities

---

92. Barbara Lang Rottenberg, The National Data Bases: A Proposal, October 1984, pp. 3-4.

93. Canadian Heritage Information Network, pp. 3-4.

94. Canadian Heritage Information Network, pp. 2 and 5, and Stephen H. Delroy, Humanities Data Dictionary of the Canadian Heritage Information Network, Ottawa: Documentation Research Group, Museum Services Division, March 1985, pp. v-vvi.

and one for the natural sciences. These National Data Bases will consist of sub-sets of non-confidential information on the individual databases (29 fields in the case of the humanities and 28 in the case of the natural sciences.) With the National Data Bases in place, curators will be able to search for particular artifacts they would like to borrow or include in an exhibition and researchers will be able to determine the location of all artifacts of a particular type or species. It is even possible that students seeking material for school assignments or oil companies looking for clues about the location of petroleum deposits might eventually have access to this information, although the latter case could pose problems in terms of the commercial use of public data.[95]

As of September 1985, CHIN had 148 institutional clients, 48 of which were on-line users. Almost 2.4 million records had been entered on the system, and work had commenced on the Humanities National Data Base to extract information that would be made available to users. It was estimated that this task would not be completed until March 1986.[96] Approximately 35 people are employed full-time at CHIN headquarters to provide hardware and software support, communications support, data entry services, database management and research services, client "trouble-shooting", documentation research, training, and consultation and liaison services with clients.[97].

C.3 The Future

The CHIN initiative has gained international recognition as one of the most ambitious museum documentation projects in the world. It offers its services in both official languages and has expended considerable effort and resources to make its system responsive to the needs of the Canadian museum community. However, as it enters the second half of the 1980s, it finds that its primary role as a central repository and provider of information about collections in Canadian museums has been somewhat modified by advances in computer technology and changing expectations among its users.

Because of resource limitations at CHIN headquarters, a moratorium has existed for some time on the acceptance of any new clients. Part of the problem can be attributed to existing hardware, and in January 1986 CHIN is scheduled to install a larger Cyber mainframe to increase on-line capacity.[98] However, the sheer size of the existing inventory of artifacts in Canadian collections, coupled with technological advances and lack of sufficient personnel at CHIN headquarters, have also been decisive factors in what appears to be another major shift in CHIN's mandate.

---

95. Barbara Lang Rottenberg, pp. 1-18.

96. Information provided by CHIN officials.

97. Canadian Heritage Information Network, p. 6.

98. Information provided by CHIN officials.

The National Library concluded in 1979, when it began intensive work on its Canadian Library and Information Network proposal, that a centralized database and network is not feasible in a country as geographically dispersed as Canada where the participating organizations are controlled by a variety of authorities falling within a number of legislative jurisdictions. CHIN appears to have come to the same conclusion, a decision which has undoubtedly been hastened by the advent of the microcomputer. This paper has already made reference to the effects of computer technology on the expectations of museum personnel. Five years ago, most museums were struggling to deal with mounds of manual documentation on their collections. The opportunity to feed this information into a terminal connected to a mainframe in Ottawa where it could be processed and retrieved with ease seemed to be the ultimate technological dream. Today, these same museums are acquiring microcomputers and are eager to do more than simply feed information back and forth to a central computer. They now wish to control their own data, to manipulate it in-house and to provide it electronically to others who may not necessarily be connected to CHIN.

In the light of these developments, CHIN has decided to reduce its emphasis on the provision of collections management assistance and the centralized storage of collections data. The increased capacity of microcomputers now makes the day-to-day manipulation of collections information a feasible local enterprise, and CHIN has publicly stated its willingness to work with regional and provincial bodies to establish local networks and databases which could serve as nodes in a decentralized network. The idea of a national inventory of museum artifacts would be retained, but it would likely consist primarily of the selected fields comprising the Humanities and Natural Sciences National Data Bases. Development of specialized national databases on such topics as available software or suppliers of museum equipment and supplies is also a possibility.[99]

CHIN also foresees for itself an increased role in the development of data standards, standard terminology and communications research. Museological organizations throughout the world are engaged in the development of cataloguing standards for special collections. Unlike libraries, museums have yet to agree on widely-accepted methods of documenting their collections, and CHIN is attempting to develop a central repository of this information to serve as a guide to Canadian museums and a basis for future Canadian standards.[100]

As part of its ongoing commitment to the improvement of museum documentation in Canada, CHIN conducted a survey in 1984 to determine the state of collections management in Canadian museums and the use of new technologies to address this application. Questionnaires were mailed to 1484 heritage institutions with just over half responding. Analysis revealed that most

---

99. Verbal remarks by Peter Homulos, Director of CHIN, to the Ontario Museum Association Computer Advisory Committee, August 26, 1985.

100. Canadian Heritage Information System, p. 8.

of the nation's medium to large institutions were among the respondents and that these organizations were estimated to account for at least 95 per cent of museum objects.[101]

The results of this survey are of considerable interest because they provide both a "snapshot" of the current situation and window on the future impact of informatics technology on Canadian museums. The following is a summary of the most relevant findings:

1) There are 37 million artifacts in the collections of the respondent museums or about 48,000 objects per collection.

2) In all major disciplines, museums on average have between 71 and 87 per cent of collections documented manually. The proportion of collections documented using automated methods ranges from a high of 12 per cent in ichthyology to a low of 0 per cent in zooarchaeology.

3) The chief factors preventing museums from maintaining complete records on their collections are as follows:

Constraint	Percentage responding "yes"
Inadequate financial resources	90
Lack of staff	90
Lack of physical space	73
Large backlog of undocumented objects	51
Inadequate method of processing information	39

4) Twelve (12) per cent of respondents had computerized systems for recording collections information. Sixteen (16) per cent planned to introduce automated procedures within the next 12 months.

5) Not surprisingly, larger museums are most likely to be automated. Fully 49 per cent of museums employing 20 full-time staff or more had computerized record systems.

6) Multidisciplinary and fine arts museums are the most likely to be computerized (28 per cent and 31 per cent respectively.) Transportation museums and halls of fame are the least likely to be automated (0 per cent for each among the respondents.)

---

101. Price Waterhouse Associates and the National Museums of Canada, Report on the Survey of Collections Management Practices and the Use of Technology in Canadian Museums, 1984, Ottawa: National Museums of Canada, October 1985, pp. 2-3.

7) Museums using automated records systems were more likely to feel that their documentation system was adequate than museums without automated systems (82 per cent as opposed to 73 per cent).

8) Overall, 25 per cent of the respondents were using computers for some application (not necessarily collections management). Another 7 per cent were planning to introduce computers during the next 12 months. The detailed results are as follows:

Extent to which museums have adopted, or plan to adopt, automated procedures for management and other applications

Application	Percent with Automated Procedures	Percent Planning Automated Procedures in Next 12 Months	Percent with No Plans to Automate in Next 12 Months	Total	Number of Museums
Payroll	12%	9%	79%	100%	(546)
Accounting	10%	13%	77%	100%	(560)
Personnel	7%	9%	84%	100%	(510)
Gift store management	1%	7%	92%	100%	(468)
Mail order	0%	5%	95%	100%	(452)
Office word processing	2%	17%	80%	100%	(534)
Typesetting	3%	7%	70%	100%	(476)
Conservation	1%	5%	94%	100%	(533)
Research	1%	9%	90%	100%	(478)
Library	2%	88%	11%	100%	(490)
Interpretation	0%	3%	97%	100%	(443)
Exhibitions	0%	7%	93%	100%	(462)
Attendance	1%	8%	91%	100%	(470)
Visitor bookings	1%	5%	94%	100%	(457)
Security	1%	5%	94%	100%	(455)
Environmental control	1%	4%	95%	100%	(452)

9) Twenty-two (22) per cent of the respondents were using the CHIN system or CHIN plus another external computer system. Forty-nine (49) per cent expressed an interest in using CHIN for collections management purposes and 73 per cent were interested in contributing information to the Humanities and Natural Sciences National Data Bases.

10) Asked whether they were interested in sharing information with other museums on museum-related interests, 85 per cent responded in the affirmative.

11) Computerization of museums has proceeded somewhat unevenly, ranging from a high of 28 per cent in Ontario to a low of 9 per cent in Newfoundland. The detailed results are as follows (the Yukon and Northwest Territories have been excluded because of small sample size):

Province	(%) Some automation	(%) No automation	(%) Planning automation
British Columbia	23.0	71.3	5.7
Alberta	26.9	61.5	11.5
Saskatchewan	13.1	85.2	1.6
Manitoba	22.2	75.6	2.2
Ontario	27.8	63.2	9.0
Quebec	22.0	68.0	10.0
New Brunswick	11.1	81.5	7.4
Nova Scotia	18.8	81.3	0.0
Prince Edward Island	25.0	75.0	0.0
Newfoundland	9.1	81.8	9.1

[102]

These results indicate that Canadian museums are already heavily committed to computerization and that a significant number of them are planning to introduce automated systems in the near future both for museum documentation and other purposes. Almost half are interested in using CHIN's services for collections management purposes, but far more (almost three-quarters) view CHIN's National Data Base efforts as their primary area of interest. For CHIN, this would suggest a decreasing role as a central data processor but an increasing presence as network coordinator. Assuming adequate resources, one can also foresee a growing need for standards development and research, as well as for consultative advice, among a Canadian museum community that is turning to automation in ever-increasing numbers. Significantly, this community does not view its problems in the area of collections documentation as the result of a lack of computing power. The difficulties most often cited are lack of personnel and lack of financial resources and, presumably, museums are expecting computers to help solve this problem by increasing the productivity of existing staff. However, to ensure that chaos does not simply become automated chaos, an influential and effective coordinating body is required to ensure that museums know what they are doing when they begin committing data to an automated system. CHIN has the desire to fulfill this role, but whether it will have the resources or the mandate to assume it is a question yet to be resolved.

---

102. Price Waterhouse Associates and the National Museums of Canada, selected information, pp. 10-33.

D. FORMAT - National Film Board

D.1 Background

The mid 1970s was a period of great activity within the cultural community in the development of electronic information processing systems. This paper has already described the birth of the library, book trade and museum databases and networks. The film and video industry also began to take an active interest in data accumulation during this period, and because of its overall responsibilities in this area, the National Film Board (NFB) took the lead to establish a system which was intended to meet the information needs of both the industry and its clients.

The film and video community is a much more diverse and heterogenous group than either libraries or museums. It resembles in certain respects the clientele served by the Canadian Telebook Agency, with the producer/distributor/exhibitor interests corresponding roughly to the publisher/wholesaler/bookstore market covered by the CTA. It is a dynamic community, consisting of everything from government agencies, such as the NFB and Telefilm Canada, to voluntary organizations, such as the Academy of Canadian Cinema and the Canadian Film Institute. It also includes the film and video producers themselves, as well as the distributors who make a film or video available to the public, and the exhibitors or video outlets where the consumer actually "acquires" the product. To complicate matters, all these actors can be either profit or non-profit oriented, meaning that a distributor can be a multinational corporation such as Paramount or a government agency such as the NFB. The data needs of the commercial Canadian film and video production sector are quite different from those of the experimental artistic video community which are yet again somewhat removed from those of government bodies such as Statistics Canada or the National Film, Television and Sound Archives.

It should be made clear at the outset that the NFB's FORMAT database does not address all these needs. It is primarily a bibliographic database which has aimed since its inception at achieving comprehensive control on a national level of all audio-visual (A-V) material such as films, television programs, videotapes and film-strips produced in Canada both in the past and in the present.[103] As such, it is very "product-oriented" and has borrowed heavily from the library community for the classification system and technology required to maintain bibliographic control. In the context of historical archival needs, FORMAT functions extremely efficiently as a source of information for consumers seeking particular types of films. The question now facing the film and video community is whether something more is required.

---

103. Donald Bidd, Louise de Chevigny and Margo Létourneau, "Computerized information system operates for A-V materials," Canadian Library Journal, December 1984, p. 324.

D.2 The Current System

The FORMAT database consists of over 14,500 records, each comprising 18 fields of information. Each film, video or other A-V product constitutes a separate record containing fields for such information as production and release dates, place of production, language, cataloguing data, title, production and distribution companies, running time, prices, screen credits, abstracts and reviews. Information is contributed by a number of media organizations according to a standard information gathering protocol consisting of the following:

1) cataloguing - Anglo-American Cataloguing Rules, 2nd edition (AARC2);

2) indexing - PREserved Context Index System (PRECIS);

3) record structure - Machine-Readable Code (MARC format).

While the NFB functions as the manager of the system, ensuring that information providers feed the database regularly and adhere to the data gathering protocols, the database itself is maintained and processed by UTLAS Inc. (University of Toronto Library Automated Systems), Canada's largest library service bureau. The main advantage of this arrangement is that standard bibliographic record creation and updating are handled by a sophisticated mainframe and software program designed for this purpose. THE NFB has therefore avoided excessive start-up and development costs and has also been able to minimize continuing data storage and administration costs.[104]

The UTLAS connection has also helped the NFB to get FORMAT into the hands of its users. First of all, FORMAT is available on-line through the UTLAS network of over 2,000 school, public, government and special libraries across Canada.[105] Secondly, specific catalogues on specific subjects are easy to produce under the UTLAS program. FORMAT's file structure within UTLAS and the coding of its MARC records allow for the extraction of sets of records according to any specified search criteria (for example, all films produced in Quebec in 1984.) This information can be passed through special UTLAS product software to produce fully formatted records including any fields specified in the search. These records (and the accompanying PRECIS subject indexes) can then be sent on magnetic tape direct to a computerized phototypesetter which generates galley proofs at approximately one-quarter of the cost of manually typeset copy.[106] This method of electronic publishing has been used to produce the NFB's annual Film and Video Catalogue since 1984, the Film Canadiana editions for 1983-84 and 1985-86 and the Cinémathèque Québécoise's Copie Zéro film

---

104. Bidd, Chevigny and Létourneau, pp. 325-327.

105. National Film Board of Canada, Film and Video Catalogue 1984/85, Montreal: National Film Board of Canada, 1984, p. II.

106. Bidd, de Chevigny and Létourneau, p. 329.

catalogue for 1983-84, as well as several other "custom-ordered" catalogues on specific topics commissioned by federal government departments.[107]

The NFB also provides on-line access to FORMAT through its own computer system. A special user-friendly program, introduced in 1984, allows users to search for A-V material by title, language, data, running time, directorthe and a number of additional fields. Anyone seeking, for example, all video-cassettes produced in Canada in English on the subject of child abuse would be able to obtain a complete list within seconds using the correct search strategy.[108] All NFB regional and district offices, except those in Atlantic provinces, now offer on-line access to FORMAT, and the eastern offices were to be brought on-stream early in 1986.[109]

The NFB now has eight full-time employees working on the FORMAT database to provide system maintenance and data entry services. In addition, it hires extra personnel to oversee specific major projects such as the production of the Film Canadiana catalogues. Operating expenses for 1985-86 have not been identified in the Main Estimates, but amount to "several hundred thousand dollars annually" according to FORMAT's manager.[110]

D.3 Future Plans

Besides expanding its on-line database search services to all NFB offices in 1986, FORMAT is also investigating the possibility of making its data available commercially through a database vendor. By the end of 1986, FORMAT hopes to have developed microcomputer on-line search software which would allow clients to download part of the database to their own systems for local search and manipulation of data. Both these plans are meant to increase access to the information residing on FORMAT, but they would also constitute potential new revenue sources for a service which is experiencing continual pressure to recover costs.

Some of the most important future initiatives undertaken by FORMAT, according to its manager, will involve cooperative ventures with other government agencies to cut costs and enhance services. Already, FORMAT has electronically published the 1983-84 Film Canadiana catalogue in cooperation with the National Library and the Public Archives at a lower cost and within a shorter time period than ever before. In the opinion of FORMAT's manager, this type of joint undertaking between major federal information providers will become increasingly necessary if they are to stay within budgets while continuing to fulfill their mandates. He sees the need for more ongoing contact among federal cultural agencies with

---

107. Information derived from telephone conversation with Donald Bidd, Manager of FORMAT, December 24, 1985.

108. Bidd, de Chevigny and Létourneau, p. 329.

109. Conversation with Donald Bidd, December 24, 1985.

110. Conversation with Donald Bidd, December 24, 1985.

related mandates, for development of more formal and informal networks and for continuous information exchange (as opposed to the sporadic contacts which are the current norm). This means a commitment to more cooperative relations in the informatics field, something which, although difficult, could have significant pay-offs for the participants.[111]

D.4 Other Developments

In 1981, the Department of Communications issued a statement supporting the principle that FORMAT serve as the "standard and framework" for any further development of audio-visual information systems.[112] While this commitment has never been retracted, it has become increasingly evident to members of the film community that FORMAT is not able to fulfill all their needs within its bibliographic data structure. Following a series of meetings in late 1983 and early 1984, several of the most prominent players in the film and video field approached the Department of Communications for assistance to carry out an implementation study on a national audio-visual data bank.[113] This data bank would include FORMAT but would also be designed to meet the management information needs of producers, distributors and exhibitors of audio-visual materials, as well as those of government departments and agencies concerned with A-V production.

A study subsequently commissioned by DOC suggested that the data needs of the film and video sector could be split in two - bibliographic and statistical. The first category, it was concluded, was being adequately dealt with by FORMAT, but the second type of data did not currently exist in any one place or in any form which was immediately accessible to the film and video community.[114] Difficult problems arose when a government official or an industry service organization wished to obtain current information on box-office receipts for feature films in a particular province or video rentals of a specific title over a given period. Such data may exist but it is not easy to determine who has it or to integrate it with information from other sources once it has been located. Statistics Canada has a sophisticated system for capturing this type of information, but there may be a two to three year time lag before this data becomes available to the industry, a situation which both policy makers and commercial interests find frustrating and counter-productive.

---

111. The information in the preceding two paragraphs was derived from a conversation with Donald Bidd, Manager of FORMAT, December 24, 1985.

112. Bidd, de Chevigny and Lêtourneau, p. 327.

113. Letter from Sam Kula, Director of the National Film Television and Sound Archives to Ian McLaren, Senior Advisor on Film Policy, Department of Communications, February 9, 1984.

114. Information derived from conversations with officials of the Film, Sound Recording and Publishing Directorate, (DFSP), Department of Communications, and from internal working documents.

For the reader who has taken in the previous sections, this situation may seem hauntingly familiar. It is evident that the film and video sector is talking about the establishment of a decentralized information network - one which would be capable of integrating data from a number of sources, processing it in a variety of ways and disseminating it to a multitude of diverse users. Like their counterparts in the library, museum and publishing fields, film and video personnel have come to appreciate the value of timely and accurate information in the efficient functioning of their operations. Unlike the former groups, however, the audio-visual field lacks the coherency and homogeneity which has provided an impetus to effective data coordination in those areas.

The film and video communities appear to be looking to the federal government, particularly the Department of Communications, to provide leadership in addressing the statistical database problem. Some preliminary work has already been undertaken within the department to launch a study which would propose a system design and data requirements for a Canadian audio-visual statistical database.[115] Urgent attention needs to be directed, however, to the policy as well as the technical implications of such a database. Evidence from other fields would suggest that such an undertaking requires, at the very least, some type of system coordinator to ensure that all participants function within the agreed-upon parameters of the network. This is hardly a trivial task as it involves, in varying degrees, a significant investment of both human and financial resources in such functions as systems maintenance and trouble shooting, standards development and consultation and advice to both providers and users. Such a continuing focus and commitment must be preceded by "seed" investment in systems development and start-up costs, and, prior to that, by a clear policy statement as to who will be spearheading the development and where the funds for all phases of the project will be derived.

Unlike the other databases and networks discussed in this chapter, the national audio-visual data bank is at an embryonic phase. Except for the nucleus formed by FORMAT, few resources have been consecrated to the automation of audio-visual information. But there is no reason to doubt that the need or demand for comprehensive information on film and video activities in Canada is equally as pressing as in other cultural areas. The sector is obviously at a threshold, and it is likely that the decisions taken by all federal film and video agencies, including the Department of Communications, will be crucial in deciding whether it crosses over into the "information age".

E. Other Projects

The foregoing sections have described several database and networking projects where federal agencies have taken the lead role. This one will provide a brief overview of a few informatics projects initiated by the cultural community itself, although it should be noted that in most cases

---

115. Source of this information is an internal DOC working document.

DOC financial participation was critical in the launching or ongoing development of these innovative ventures.

E.1 The Canadian On-Line Record Database (CORD)

One of the most ambitious database products to emerge from the cultural community came from the Canadian sound recording industry and was the product of a collaboration between the Canadian Independent Record Production Association (CIRPA) and the Association de Disque et de l'Industrie de Spectacle Québécoise (ADISQ) which formed the CIRPA/ADISQ Foundation to develop a Canadian Record Catalogue.

The project began simply enough in 1981 as a non-automated database of information about Canadian records. Following the introduction of Canadian content regulations in broadcasting, Canadian radio stations discovered that American record catalogues were sorely lacking as information sources on Canadian music. CIRPA/ADISQ decided that the time was ripe to fill this gap and launched the Canadian Record Catalogue, a publication which has been credited with responsibility for a dramatic increase in the sale of Canadian records.[116] It did not take the record industry long to see the possibilities inherent in computerization of the database. The ability to search for specific titles or artists and to produce customized listings, either for retail sales purposes or to develop airplay charts, had obvious advantages. Therefore, when CIRPA/ADISQ approached the Canadian Radio-television and Telecommunications Commission (CRTC), the Department of Communications and the Department of Supply and Services (DSS) in 1982 for financial assistance to automate the Canadian Record Catalogue it found a receptive audience.

What happened next reveals how easily the seemingly solid ground of a high technology project can give way to the quicksand of visionary dreams and uncertain markets. During the period between 1982 and 1985, the Canadian Record Catalogue project (which changed into the Canadian On-Line Record Database along the way) received over $500,000 from DOC's Special Program of Cultural Initiatives alone to carry out research and development activities. Additional investments of public funds made by Employment and Immigration Canada, the Department of External Affairs and DSS amounted to close to $300,000. The project had by this time blossomed into a high-profile showcase for several additional high technology applications in culture and the arts which went far beyond the original modest proposal for a computerized database.

During the early 1980s, the Department of Communications was committed to the development of practical applications for its Telidon videotex technology. The Canadian Record Catalogue presented a seemingly golden opportunity to marry the Telidon graphic to the database record, thereby producing a screen which not only showed the facts about a record album but also

---

116. Lydia Dotto, "Rock around the data base", Information Technology, September 1984, p. 130.

displayed a reproduction of its cover. A prototype of the system was first demonstrated at MIDEM '82, the world record industry trade fair.[117]

CIRPA/ADISQ also embarked on an experimental project to permit music and voices to be entered and stored in digital form on the database using a Canadian music computer called the Interactive Music Processor (IMP). This system would also allow users to retrieve both the music and the score on the screen. The ultimate goal was to develop a system to deliver music directly to the consumer's home over cable or telephone lines linked to a personal computer equipped with a special "black box" decoder. The decoder would convert computer data back into music much the same way as a Telidon decoder converts such data into text and graphics on the screen. Such a "home juke box" was seen as one way of eliminating illicit copying by offering consumers low-cost, high-quality music productions which could be stored in the consumer's own tape or diskette system and replayed at will.[118] While the prototype system for entering music on the database was developed, even the most enthusiastic proponents of the "home juke box" admitted that it was likely to be several years before tele-purchasing of individual songs at the consumer level became a practical reality.[119]

After several years of steady work on the CORD database and explorations of the system enhancements described above, the CIRPA/ADISQ Foundation reached a crisis point in mid-1985. While CORD was acknowledged to be at the vanguard of efforts to integrate Telidon graphics with database information, there turned out to be little commercial demand for such a product, and developmental work was suspended. While a prototype system using the IMP computer to store and retrieve music on CORD was demonstrated at MIDEM '85, this project also had to be abandoned due to lack of funds.[120]

As for CORD itself, data gathering and editing is now being carried out by a skeleton staff of 1½ persons, but entry of information on the database was suspended during the latter part of 1985. There are now over 167,000 individual records entered on CORD, but maintenance of this data alone on a service bureau computer costs several thousand dollars a month, and CIRPA/ADISQ has decided to retrench and revise its approach before committing itself to the costly task of entering the over 80,000 records that remain outside the system.[121]

---

117. Letter from Earl Rosen, Executive Director of CIRPA/ADISQ to the Honourable Ed Lumley, Minister of Communications, July 17, 1984, p. 2.

118. Lydia Dotto, pp. 128, 130 and 132.

119. Lydia Dotto, p. 132.

120. Information derived from author's conversation with Donna Murphy, Editor of the Canadian Record Catalogue, January 2, 1986.

121. Conversation with Donna Murphy, January 2, 1986.

During 1984, CIRPA/ADISQ committed itself to expanding the Canadian Record Catalogue to list all records sold in Canada, as opposed to only Canadian records. This was seen as a necessary step to make the Catalogue competitive with a rival American publication, Phonolog. The decision entailed not only a 500 per cent increase in the size of CORD but also a complete restructuring of the database to improve the quality of the information provided. For example, many of the fields of information in each database record had to be expanded to include new sub-fields which would allow for deletion, reissue under a new product number or changes in the price of a recording. In addition, to accommodate new products such as rock videos and compact discs, the database had to include new types of records indicating the existence of these formats and linking them to their phonograph record or audio cassette counterparts elsewhere on CORD.[122]

This restructuring also involved the conversion of all existing records to the new standards, a lengthy process of re-programming and re-editing. New indexing standards had to be developed to satisfy the cataloguing and referencing needs of CORD's library clients. Moreover, the inevitable concern with standard terminology also surfaced during this review, and CORD staff also had to develop rules for spelling of names and validation of information to ensure uniformity between records.[123] Most importantly, cooperative relationships had to be developed with all major record companies to obtain the information for a new expanded CORD. Their commitment was considered essential to ensure that all new releases, deletions and changes were entered into CORD on a ongoing basis.[124].

At this point in time (early 1986), CORD is at a decisive period of its history. After flirting with a number of exciting but extremely speculative adjuncts to its system, it appears to have decided to return to the "bread and butter" issue of providing timely and accurate information for the benefit of the Canadian sound recording industry. Unfortunately, while the database restructuration is almost complete, no new version of the Canadian Record Catalogue has appeared since 1983. Catalogue sales have therefore declined drastically and financial support from the recording industry has also dropped off.[125] According to the editor of the Canadian Record Catalogue, federal agencies such as Statistics Canada, the CRTC and the National Library support the continuation and the refinement of CORD and consult the database regularly. However, until revenue sources are found to reactivate data entry and ongoing research at a fully operational level, the enterprise is likely to remain in limbo.

---

122. CIRPA/ADISQ Foundation, Final Report - Canadian Record Catalogue, submitted to the Cultural Initiatives Program on June 20, 1985, p. 3.

123. CIRPA/ADISQ Foundation, Final Report, p. 4.

124. CIRPA/ADISQ Foundation, Final Report, pp. 6-7.

125. CIRPA/ADISQ Foundation, Financial Statements, March 3, 1985.

The CIRPA/ADISQ Foundation is now considering what measures might be taken to relaunch CORD as a purely information processing service. Preliminary estimates by the Foundation indicate that at least three to four full-time staff are required to carry out research, database maintenance and entry services. Conversion to an in-house, microcomputer-based system is also being considered. Given recent advances in technology, this might be feasible and could eliminate high data maintenance costs for data storage on service bureau computers. Introduction of a "charting" system to track statistics such as airplay and sales would also increase the attractiveness of the database to the industry and to CORD's government clients, as would the production of special catalogues to satisfy specific industry needs. Above all, CIRPA/ ADISQ must begin again to produce its Record Catalogue on a regular basis in both print and microfiche versions, since few clients (or potential clients) have the means or the desire to do on-line information searches of CORD.

Implementation of these measures, along with the entry of remaining outstanding data, is estimated to cost approximately $150,000. A further $125,000 annually would probably be required to maintain CORD as a useful source of recording industry data.[126] The proposed federal radio and sound recording policy may address the funding issue indirectly if it includes provision for ongoing support for service organizations such as the CIRPA/ ADISQ Foundation.[127] It would be desirable, however, if both government and industry also devoted some specific attention to the information needs of the sound recording sector to ensure that the "growing pains" of the last few years are not repeated.

E.2 Waterloo - Wellington Museum Computer Network (WWMCN)

In 1972, before the Canadian Heritage Information Network or even the National Inventory Program was born, a small museum in Waterloo, Ontario began to use a computer to manage its purchasing, payroll and collections. That small institution was the Museum and Archive of Games, which was in the fortunate position of being affiliated with the University of Waterloo, a world-renowned centre for high technology research and experimentation. The Museum was able to benefit from the University's "open computing" policy which encouraged all campus organizations to make use of the central mainframe computers. Over the years, the Museum's automated systems increased in both scope and sophistication. Other institutions in the immediate area became interested in acquiring access to the same kind of resources, and in 1982 the Waterloo-Wellington Museum Computer Network (WWMCN) was formed.[128]

---

126. These estimates and the information in the preceding paragraph have been derived from a conversation with Donna Murphy, January 2, 1986.

127. See proposals contained in Initiatives for the Radio and Sound Recording Industries, a discussion paper prepared by DOC and released on July 15, 1985, p. 23.

128. E.M. Avedon, "A Community Museum Computer Network", Muse, (Summer/ July 1985), p. 18.

This network consists of ten Waterloo-area museums ranging from art galleries to industrial museums to historic houses. With assistance from the Ontario Ministry of Citizenship and Culture and Employment and Immigration Canada (and later, in 1984-85, from DOC's Special Program of Cultural Initiatives), the cooperative purchased microcomputer systems which were hooked up to the University of Waterloo's mainframes. With assistance from the University, each museum was able to design a system suited to its particular needs, yet compatible with the central computer and capable of communicating with the other network participants.[129]

Using the mainframe, each museum is able to:

i) manage a database of information on its collections;

ii) maintain a calendar of museum events and staff appointments for a year at a time;

iii) edit very large reports using statistical or other information stored in its collection database;

iv) send electronic mail to other network participants;

v) create multiple letters and mailing labels from mailing lists stored on the mainframe;

vi) create exhibit labels, drawing from information stored on the collection database.

With the help of standard, off-the-shelf software, the network members are also using their microcomputers in their "stand-alone" capacity for:

i) letter and report writing;

ii) budget preparation;

iii) management of personal mailing lists and supplier lists;

iv) management of museum membership and donor records;

v) payrolls;

vi) giftshop inventory management;

vii) accounting and general ledger functions.[130]

---

129. E.M. Avedon, Muse, p. 19.

130. E.M. Avedon, Muse, pp. 20-23.

During the course of the Network's pilot phase, experiments were also carried out to determine the feasibility of incorporating graphics or photographic images into the collection record. With such an interface, users would be able to call up on their computer screens both text and images describing items in their collections. Some investigation of Telidon, videodiscs and other methods of digitizing images took place, but the Network concluded that producing and storing such images, while technically feasible, was still too expensive for use by ordinary museums. Further work has been suspended until commercial vendors have produced cheaper image-capturing systems capable (unlike current videodiscs) of expanding as a museum collection grows.[131]

A staff of five clerical workers and a supervisor were hired during the Network's pilot phase to prepare and input data, process files, develop procedures and teach permanent personnel in each of the museums how to use the computer. These individuals had no prior computing experience and had to take one-month training courses at the University before joining the project. By the end of the pilot phase, two of them were offered permanent jobs by the museums in the Network, and the other four had found related employment in other types of organizations. The central Network staff no longer exists, but all Network museums have assigned permanent staff to computing duties on either a full or a part time basis. These staff members have spontaneously formed a "users group" which continues to share skills and knowledge and to offer workshops and training sessions to others interested in acquiring computer skills. The Network considers that one of its major accomplishments has been the skills upgrading of women clerical workers employed by the project.[132]

After almost four years of existence, the Network is firmly established as a part of the ongoing operations of the participant museums. It has attracted a good deal of interest throughout Canada and in other parts of the world to the point where the Ontario Museum Association, in consultation with the Ontario Ministry of Citizenship and Culture and the Canadian Heritage Information Network, is considering the establishment of other local museum networks in other parts of the province. Ultimately, it is hoped that these local networks will communicate with each other and will form regional nodes for the collection of information to be fed either directly or through a central provincial node into the National Databases administered by CHIN.[133]

---

131. E.M. Avedon, Management Applications in a Community Museum Computer Network, (Summary Final Project Report for the Special Program of Cultural Initiatives), May 1985, pp. 8-9.

132. E.M. Avedon, Management Applications in a Community Museum Computer Network, pp. 10-11.

133. Information derived from conversations with E.M. Avedon of the Waterloo-Wellington Museum Computer Network, Peter Homulos of CHIN and Greg Baeker of the Ontario Museum Association.

Besides improving the day-to-day management of the participant museums, the Network has fostered a spirit of cooperation among the group which has led to other joint activities such as group purchasing, a regional tourism promotional brochure and shared conservation efforts.[134] Informatics is seen as the key that has unlocked the door leading to greater cooperation. It also functions as the glue which holds the Network together by fostering and enhancing the information that is shared.

E.3 Periodical Writers Association of Canada (PWAC) Network

The Periodical Writers Association of Canada (PWAC) is a loose federation of freelance magazine writers scattered across Canada. In 1984, this group applied to the Special Program of Cultural Initiatives for financial assistance to automate the PWAC national office in Toronto and to create a computer network linking PWAC chapters in Victoria, Vancouver, Edmonton, Calgary, Toronto, Montreal, Ottawa and Halifax. At the end of the twelve-month project period, the organization's communications and administrative procedures had been substantially transformed.

Electronic mail has proven to be the most significant aspect of the project. Before automation, the regional chapters conducted business with the national office by mail or over the telephone. The former was usually too slow for most practical purposes, while the latter was inordinately expensive. Once PWAC was automated it discovered the Immedia Telematics electronic mail service. For a single initiation fee of $120, Immedia provided mailboxes for the national office, each regional chapter, each executive board member and any individual member who requested one. The minimum monthly charge was waived, and PWAC was billed only for actual time spent on-line at a rate of 25¢ per minute. By December 1985, sixty-eight mailboxes had been signed on.[135]

Almost immediately, PWAC discovered that the isolation inherent in a widely-dispersed organization could be overcome by the use of new technology. Discussion papers could be circulated for comment, revised, then recirculated within tight time frames and at a reasonable cost. PWAC's submission to the Sub-committee on Copyright of the House of Commons Standing Committee on Communications and Culture was prepared this way. The Calgary chapter has been given major responsibility for organizing the literary arts component of the 1988 Olympics, and has used electronic mail extensively to discuss and generate ideas. Individual members are sending copy direct to their publishers using the electronic mail system and are freely exchanging information and advice on everything from computer software to job opportunities.[136]

---

134. E.M. Avedon, Muse, p. 24.

135. Norma Crawford, PWAC Development and Communications Project (Final Report submitted to the Cultural Initiatives Program), December 1985, p. 5.

136. Norma Crawford, pp. 6-7.

Within the national office, automation has streamlined many of the tasks that formerly consumed large amounts of staff time. The PWAC National Newsletter is now produced entirely by computer, with contributors across the country filing their copy by electronic mail and national staff editing, formatting and printing camera-ready copy entirely by electronic means. Other publications, such as the Directory of Members and the Fees Survey, are also being produced in this manner.[137] Mailing lists, personalized form letters and routine minutes and reports can be generated with much greater ease, alleviating a substantial burden on the two-person national office staff.

On the other hand, the road to automation was often rockier than PWAC had originally anticipated. The start-up period for the network turned out to be twelve months rather than the originally anticipated six months. PWAC members had not appreciated the time required to learn even basic computer applications, and they were further handicapped by the fact that their budget did not allow for the hiring of expert advice. While this situation proved advantageous in the end by forcing the organization to learn about its system "from the ground up", it did lead to a number of false starts and a certain degree of frustration, particularly with regard to database applications such as the Directory of Members.[138]

A more long-term concern is future staffing costs for the national office. Providing computer training for new staff requires time and money. Alternatively, personnel with computer experience are able to command higher salaries in the job marketplace. Both options place small cultural organizations with limited budgets at a disadvantage: PWAC discovered that salaries for secretaries with computer training were 80 per cent higher than for those without that skill. However, someone with no experience would be of no immediate use in the office's computer environment.[139]

Despite the difficulties of automation and networking, PWAC considers its technological experimentation a success. It is making plans to put some of its publications on a commercial database and to encourage the use of its network by more individual PWAC members. At the end of 1984, the national office had only one typewriter and only very limited knowledge of computer technology. At the end of 1985, it is making plans to establish a copyright collective which would handle photocopy and computer database rights to its members' work. This would necessitate expansion of its computer system, but would permit the organization and its members to draw direct financial benefits from the information they provide in the electronic marketplace.[140]

---

137. Norma Crawford, pp. 2-3.

138. Norma Crawford, pp. 2-3, and personal correspondence with the author, December 13, 1985.

139. Norma Crawford, personal correspondence, December 13, 1985.

140. Norma Crawford, personal correspondence, December 13, 1985.

E.4 Artbase and Artnet

Artbase and Artnet are two activities of Cultural Software, a non-profit Toronto organization dedicated to research and development of cultural applications making use of microelectronics, computers and communications technologies. Cultural Software's major objective is somewhat ambitiously given as the "integration of culture and technology".[141] Its organizational structure, unlike those of most of the other networks and databases discussed in this section, is loose and informal, consisting of a number of experimental artists who maintain computer hardware and software in the basement of the Artculture Resource Centre and offer technical and creative assistance to the local artistic community at low rates.

Cultural Software recognizes what it calls "the immaterial economy of information", taking as a basic premise the idea that "the "software" of a culture is its ideas, their generation, exchange, diffusion and transformation."[142] However, its approach to the problems and opportunities of the "information economy" is a typically artistic and personal one.

A standard business or government strategy to database and networking activities begins by plotting in advance all the goals and milestones toward establishing an operating system. The task of implementation is broken into component parts, all sub-tasks are clearly defined and all progress is closely monitored to measure whether it is "on target". In Cultural Software's case, its information-providing activities have developed almost as organic offshoots from its other services to the artistic community. (These services include a media access centre, which provides electronic equipment for artists working on creative projects, and a consultative service (Artserve) which helps non-profit cultural organizations set up electronic information systems.) In response to a perceived need for information on a variety of topics, Cultural Software has simply proceeded to set up the relevant databases on its existing microcomputers and to provide access through an electronic bulletin board to anyone with a computer and a modem.

Such a piecemeal and "grassroots" approach may make no sense to technical and business-oriented personnel who have traditionally controlled the use of informatics technology. But it is standard artistic practice to tinker with the media and to take experimental techniques to their logical (or illogical) conclusions. Failed experiments litter the artistic landscape, but it is this constant probing and stretching of the media to their limits that has been responsible for those artistic breakthroughs, such as the development of artistic perspective and the plays of Shakespeare, which have revolutionized society's perceptions of reality.[143]

---

141. Cultural Software information brochure, (undated), p. 2.

142. Cultural Software brochure, p. 2.

143. For a discussion of the differences between "hard" and "soft" mastery of technology, see Sherry Turkle, The Second Self: Computers and the Human Spirit, New York: Simon and Schuster, 1984, pp. 101-108.

Adopting this "ad hoc" approach, Cultural Software began in May 1985 to set up Artbase, an eclectic mix of cultural databases designed to serve Toronto-area artists. This service is available through Artnet, an on-line information and communication system available 24 hours a day to anyone with a computer and a modem. Artbase uses standard off-the-shelf software to store information, but the Artnet software was specially developed by a computer programmer hired with money provided by the Canada Council. Three persons currently work on a part-time basis to manage the network, gather information and enter data. Two full-time staffers were hired between May and October 1985 with the help of a grant from Employment and Immigration Canada to test software, develop a data dictionary, and carry out some of the data research and entry. Their departure has somewhat hampered the speed of development, but has not caused the dislocation the might have been the result in a more structured type of project. Cultural Software personnel merely acknowledge that theirs is a project that will never be "completed" in any final sense of the word,and they are fully prepared to pursue it indefinitely in whatever direction and at whatever speed resources permit.[144]

Artbase currently contains information on:

i) Media Artists - 650 records of artists working creatively with new technologies

ii) Computerized Organizations - 100 records of non-profit arts organizations possessing computers

iii) Network Access Information - general information on how to access over 100 databases and networks (including Artnet)

iv) Media Resources - 60 records of profit-oriented companies providing media services and resources to artists

v) Arts and Cultural Organizations - 200 records on local, regional and national arts and culture organizations (including mainly museums, art galleries and artist-run spaces)

vi) Current event listings - the size of the database varies depending on the number of artistic events taking place.

Cultural Software is also working on small databases to provide:

i) a directory of persons available to provide technical assistance to artists working with new technologies

---

144. Information in this and the following paragraphs provided in a telephone conversation with Jan Levis, Communications Officer for Cultural Software, January 7, 1986.

ii) a listing of arts and technology publications

iii) a directory of organizations providing funding for artists

iv) a biographical index of Toronto artists.

Artnet currently has 54 subscribers. Cultural Software also encourages "walk-in" business for those without access to computer equipment. No fee is charged, either for network access or database use, although Cultural Software is considering imposing a small fee later in 1986. Artnet essentially provides electronic mail and bulletin board services. Communication is point-to-point only, but has engendered a good deal of interactive interchange between users. Since Artnet is considered a public utility for the Toronto media arts community, anyone is free to download information from Artbase to his own computer and to print and distribute it freely. In all this activity, copyright issues have not yet arisen.

Cultural Software is currently publicizing Artnet and Artbase in an attempt to gain more subscribers. It hopes to encourage a greater degree of dialogue between local media artists on a variety of issues and has plans, among other things, of introducing a "graffiti" board where artists could post electronic messages on various subjects to invite free comment by other members of the community. It would also like to store and distribute computer art through the network as part of its commitment to freer creative exchange.

The main roadblock to expansion of Artbase/Artnet services is a current lack of hard disk storage space and a chronic shortage of human resources. Cultural Software believes that it can sustain the operation through ongoing funding sources (mainly grants from public agencies). However, additional financing will obviously be required for any "extras". Cultural Software, in this regard, typifies the traditional difficulties of the artistic community which generally finds its fundraising activities handicapped by its somewhat unorthodox approach to planning and organization. By placing a premium on creative expression, usually at the expense of central administrative control and direction, artists find themselves at odds with most of those who control the pursestrings. Cultural Software's network is serving a need within its community, but its vocabulary for communicating this fact has not been successful in freeing-up large numbers of dollars for system enhancements.

E.5 Ontario Library Service (Escarpment Region) Library Telecommunications Pilot Project

While most of the networks so far discussed have been developed at the impetus of the federal government or the cultural community, it is worth noting that certain provinces have also taken a lead role in this high-stakes game. In May 1984, the Ontario Ministry of Citizenship and Culture announced its intention to fund the wholesale automation of Ontario public libraries. As part of this program, the province provided $300,000 to

undertake a library telecommunications pilot project in the Escarpment Region that would link 26 public libraries from Peel to Niagara. The network is designed to improve interlibrary loans by giving libraries electronic access to each other's listings and by improving the efficiency of exchange arrangements. It is meant to test the feasibility of networking at a local level and to serve as the forerunner of a province-wide, fully automated telecommunications network in Ontario public libraries.[145]

The pilot project is scheduled to run until March 1986. If successful, it will be extended around the province in a phased approach through the remainder of 1986 and 1987. Such a long-range plan is only feasible, however, if large numbers of provincial public libraries have automated the management of their collections. Therefore, the province has earmarked $1 million annually for library computerization and for the establishment of cooperative automation projects. Large libraries in the Ontario heartland can obtain up to 50 per cent of the cost of computer hardware and software, as well as 50 per cent of the cost of building a machine-readable database, from the Library Cooperative Automation Program.[146] Small libraries in communities with populations of 50,000 or less can obtain up to 80 per cent of these costs under the Automation Program for Small Libraries.[147] Those in the northern part of the province are eligible for compensation for up to 65 per cent of their computerization and database costs under the Northern Libraries Automation Program.[148]

Ontario's networking project, if it proceeds as planned, will obviously form a large and important part of the Canadian Library and Information Network outlined in section 6.1.A. From the public information released on the Ontario program, it is difficult to determine to what extent protocol development and data standards are being coordinated with the research being carried out by the National Library of Canada. The rapidity with which provincial and regional library jurisdictions throughout the

---

145. Ministry of Citizenship and Culture, "The Honourable Lily Munro dedicates new telecommunications pilot project in Hamilton," News release/Communiqué, September 25, 1985, pp. 1-2.

146. Libraries and Community Information Branch, Ministry of Citizenship and Culture, Library and Cooperative Automation Program Criteria, May 1984, p. 1.

147. Libraries and Community Information Branch, Automation Program for Small Libraries Criteria, October 1985, p. 2.

148. Libraries and Community Information Branch, Northern Libraries Automation Program Criteria, September 1985, pp. 1-2.

country are moving toward electronic information exchange indicates, however, the increasing strategic importance of a coordinating presence at the federal level. The decentralized library network, as predicted by the National Library, is becoming a reality and, if the "Tower of Babel" model is to be avoided, the federal role as "traffic cop/translator" clearly should be strengthened.

6.2 Office Automation

6.2.1 Office Automation in Cultural Organizations

Why automate the offices of cultural organizations? Such a question can be answered in a number of ways. One way to begin is to outline those functions that an automated management and control system must perform in any organization, whether cultural or non-cultural, profit of non-profit. These include ensuring that:

(1) all money, paid or received, is accounted for honestly;

(2) relationships with customers and suppliers are not damaged by a failure to deliver goods or services promised or to pay for those received;

(3) the physical assets and working capital of the organization are managed properly;

(4) all employees are paid promptly and accurately;

(5) management has the information about the present working of the organization to plan its future progress;

(6) progress against the current plan can be monitored in sufficient detail to take timely and effective corrective action if necessary;

(7) accurate, well-prepared letters and documents can be produced quickly and at minimum cost;

(8) information on the people with whom the organization does business is readily available.[149]

In the current climate of government cutbacks and frozen revenues, many arts and cultural organizations face increasing pressure to streamline their management operations and to function more like a "business" than ever before. However, the arts as a "business" have a number of unique characteristics which distinguish them from commercial companies and which

---

149. Iwan Williams, Computers and Arts Management, London: Calouste Gulbenkian Foundation, 1982, p. 10.

make finding the best software to meet their needs a difficult task. A study carried out in the United Kingdom by the Calouste Gulbenkian Foundation identified these major differences: the general conclusions are equally applicable to arts and cultural organizations in Canada.

(1) Arts organizations are almost entirely cash businesses, like most retailers.

(2) Unlike retailers, they derive different kinds of income from different sources. These include:

- primary income: earnings from the organization's primary activity (e.g. box-office receipts or book sales)
- secondary income: earnings from subsidiary activities (e.g. bars, restaurants, gift stores)
- grants and donations
- other income (e.g. earnings from hiring out facilities or from royalties).

(3) Analysis of how, when and where primary income is received is a major piece of marketing research, both in terms of uncovering historic trends and suggesting immediate action.

(4) Substantial parts of grant income come from public bodies which may:

- commit funds long before they hand them over
- make specific reporting requirements
- earmark grants for specific projects.

(5) Because of the reporting requirements of public granting bodies, the budgeting structure is extremely complex.

(6) In producing organizations (e.g. theatres), the execution of these budgets requires a number of cash floats to each producer for each production.

(7) Payroll calculations can be unusually complex where performers are involved because:

- entertainment industry contracts may include a complicated series of allowances which are treated as part of gross pay;
- many performers occupy a grey area between employment and self-employment which makes the calculation of net pay more difficult;

- other elements, such as royalties or cash advances, may have to be included in pay.

(8) Royalty payments are an important item of expenditure and frequently require complex calculation based on income details.

(9) The mailing list is a major marketing and fundraising tool of many cultural organizations.[150]

Despite the complexities of their computing requirements, many arts and cultural organizations have "taken the plunge" into office automation in at least three separate areas: financial and managerial control, mailing list management and word processing. As a general rule, they have used off-the-shelf microcomputer hardware and software, mainly because that is all that is available. Only in the area of box-office software(see Section 6.3) has any concerted attempt been made by the private sector to meet the specific needs of cultural organizations. Even here, however, not all computing problems have been solved, and integrated systems to improve the efficiency and effectiveness of the "business" of culture are not yet a reality.

In Canada, particularly over the past three years or so, cultural organizations have been automating their management systems at a steady rate. No comprehensive statistics exist on the extent of computerization within the cultural sector, but those surveys that have been done confirm that automation is well under way.

As indicated in Section 6.1.C.3, approximately 25 per cent of Canada's medium to large museums have already introduced automation and another 7 per cent are actively considering whether to do so. By far the most popular uses for computers in museum administration (other than collections management) involve payroll administration and accounting. Word processing does not seem to have made as significant an impact, but it is the application most likely to be next on the list as far as museum managers are concerned.

Since 1983, the Cultural Initiatives Program (formerly the Special Program of Cultural Initiatives) has included a component providing financial assistance to Canadian, non-profit, cultural organizations for management development projects, a large number of which have included office automation. While the Program does not provide comprehensive information (there are an indeterminate number of cultural organizations which have automated without support from the Department of Communications), it is probably one of the more reliable indexes of the degree to which cultural organizations are computerizing their day-to-day operations. The following table provides a breakdown by cultural discipline:

---

150. Iwan Williams, p. 12.

Office Automation Projects Funded by the Cultural Initiatives Program April 1, 1983 to March 31, 1986[1]

Discipline	Number of Projects	Dollar Value
Music[2]	15	119,429
Theatre	16	212,228
Writing and Publishing	7	107,854
Film and Video	10	158,005
Museums and Galleries	14	378,793
Dance	3	12,663
Sound Recording	2	12,624
Libraries	2	23,550
Heritage organizations	1	6,147
Arts Centres	5	168,984
Arts Councils	9	121,202
Others[3]	6	190,564
TOTALS	90	$1,512,043

1 Does not include projects where technology was being used primarily for creative purposes. Disciplinary breakdowns include service organizations for those disciplines.

2 Includes orchestras, choirs, opera, etc.

3 Includes multidisciplinary projects, festivals, folk arts organizations, performing arts organizations.

The majority of the CIP recipients were primarily interested in utilizing computers for financial management and word-processing, but a substantial minority were also hoping to set up various types of databases. These databases were often only simple mailing lists of members or donors, but in certain cases, included relatively complex information requiring sophisticated data management techniques. For example, the Canadian Musical Heritage Society created a full bibliographic index to its entire collection of pre-1920 Canadian music, and the Cinema Canada Magazine Foundation developed a databank describing all the documentation held in its archives (which included reports and articles accumulated over the course of the past twenty years.) The Association of Canadian Orchestras has installed a number of on-line databases to provide information on all personnel involved with Canadian professional orchestras cross-referenced by location, role, organization and service provided. When fully operational this database is expected to contain up to 36,000 records. La Compagnie Jean Duceppe has created a database of touring venues, including

details about performance spaces and contact persons, which it is confident will make the organization and scheduling of tours much simpler and more efficient.[151]

As stated at the beginning of this paper, technology applications in the area of culture tend to be heavily oriented toward the development of content, whether creative or administrative. The number of cultural organizations that have used office automation systems purchased with the help of the Cultural Initiatives Program to improve their "information provider" function tends to confirm this generalization. Even if the information gathered is not intended for consumption outside the organization, it is frequently considered to be vital to the successful operation of the enterprise (as was the case with the touring database of La Compagnie Jean Duceppe). It is therefore important for cultural organizations to have computer systems which are easy to use and accessible to all those requiring access to the information base.

6.2.2 Office Automation in General: Success of Failure?

The National Assembly of State Arts Agencies (NASAA), an umbrella group for American arts granting councils, had as early as 1977 begun to consider the information needs and priorities of its members in the light of an accelerated trend toward automation of the grant-giving function. The organizers of the National Information Systems Project (as the end result of these deliberations came to be known) had realized, that:

> Each of us was developing computer systems for arts management. Each of the systems was being developed independently. Each system, when developed, would be unique. We would all be collecting information in our own way and there would be no way to compare what we were collecting.[152]

To help overcome this problem, the NASAA developed both a standard method of organizing and labeling information and a standard methodology to help its member arts councils implement the systems that had been developed. The interesting aspect of this project was the fact that it focussed primarily on the information needs of the participants rather than on automation per se. As a result, the National Information Systems Project has the rare distinction of being designed to work equally well on manual and automated systems. The NASAA publication on this subject even makes the relatively unheard-of statement that "not every arts agency needs a computer to handle its information requirements, and not every problem can be solved by automation."[153]

---

151. Information derived from SPCI/CIP files.

152. Mary Van Someren Cok, All in Order: Information Systems for the Arts, Washington, D.C.: National Assembly of State Arts Agencies, 1981, p. 7.

153. Mary Van Someren Cok, p. 41.

Having said that, NASAA goes on to outline a methodology for implementation of a national standard information system which assumes that most of its member organizations will require at least some computing capacity to operate efficiently. Nothing in this methodology could be characterized as revolutionary: indeed, most of it is basic common sense. However, because the topic of information systems, particularly automated information systems, has not always been approached in a down-to-earth fashion, it is worthwhile to summarize the NASAA approach, which could easily be applicable to any office automation project in culture and the arts:

Step 1: Determine Output

Decide (1) what the system must provide to meet the organization's needs;
(2) how often and how quickly this information will be required.

Step 2: Determine Input

Decide what data need to be put into the system in order to produce the desired output.

Step 3: Design System

Develop a plan or system design which establishes guidelines for how data will be:

- stored;
- manipulated;
- reported.

Step 4: Choose Methods

Decide how the system is going to do what it needs to do. (This includes the question of whether manual or automated systems are most effective in a particular office. Factors that need to be considered include performance, timeliness and cost, including hidden costs such as training, data conversion and additional furniture and supply requirements.)

Step 5: Test New System

Data test: checks the collection and storage of the system's data

Unit test: checks the parts of the system that manipulate information to verify that data can be added, deleted or changed without mishap.

System test: combines the data and unit tests to ensure that the various parts of the system work as well together as they do alone.

Step 6: Document New System

Document the way in which the system is set up and intended to be used by compiling:

(1) a system design book, collecting all output, input and system design specifications in one place and including detailed descriptions of how the system was planned, how it works and why it was set up as it was;

(2) a runbook, telling people how to put information into the system and produce reports, who is responsible for given tasks and when these tasks should be carried out.

Step 7: Train Users

Teach users how the system works and how to use it to obtain the information they desire.

Step 8: Operate Parallel Systems

Operate the new system simultaneously with the old one until it is clearly capable of assuming its tasks alone (ie. performs according to its objectives within the day-to-day work environment.)

Step 9: Discontinue Previous System

Stop the old system when the organization's staff is adept at using the new one and all the organization's information needs are being met.[154]

Unfortunately, despite the existence of such a straightforward and logical methodology, it would appear that office automation in both cultural and non-cultural organizations does not always proceed smoothly. One of the reasons for this, as suggested in a recent article by Ted Grusec of DOC's Informatics Applications Directorate, is that "faulty understanding of office work has bred faulty modes of office work analysis."[155] One of the findings of the evaluation of the DOC - sponsored Office Communications Systems field trials (already referred to in Section 4.1 of this paper) was that the users' needs were not always met by office automation systems. More often than not, "standard" office needs and procedures were assumed to exist, while reality indicated that no two offices functioned identically. As Grusec observed:

---

154. Mary Van Someren Cok, pp. 65-100.

155. Ted Grusec, "Office automation in government offices: "productivity" and other myths," Optimum, 1985, Volume 16-2, p. 20. In a subsequent conversation with the author (March 17, 1986), Mr. Grusec suggested that this was potentially the most valuable lesson learned from the field trials. New technologies cannot be applied in an office setting by formula. Productivity cannot be measured simply by counting keystrokes or telephone calls. Office automation technology cannot be generalized; in fact, the concept of "office automation" as a generic activity may well have to be discarded in favour of a site-specific approach.

> Tales abound in rumours and the literature about electronic systems which failed to be accepted because the conceptions and measures of various kinds of analysts failed to produce truly useful systems. Managers, executives and the professionals and support staff closely associated with them do not follow specifiable procedures that can be turned into computer algorithms.[156]

Other conclusions of the field trial evaluations have already been cited in Section 4.1 of this paper, but bear repeating here:

(a) Systems failed to perform as well as advertised,

(b) Systems take much more time to learn than anyone had foreseen. Everybody underbudgeted for training,

(c) Even when they had been learned, the systems offered less than people expected.[157]

The lesson to be learned from the federal government's own experience in the field of office automation is, in the words of James R. Taylor of the Canadian Workplace Automation Research Centre, that "what people in offices want from the new technology is not better computing, but better communications and better tools for reasoning together."[158] There is no mystery about this conclusion: it is based on the simple observation that "decision-making in organizations is typically collective and involves judgement and experience much more than the results of some computing process"[159]

6.2.3 Applying the Lessons: the Cultural Context

Cultural organizations have, if anything, even more varied and unpredictable procedures than the typical government office. Some may be involved primarily in production (such as a theatre or a dance company) and will need computerized office systems capable of handling complex financial and scheduling arrangements for tours or for annual subscription drives. Others may be primarily distributors (such as film, video or magazine distributors) which must tie numerous and varied rental or sale arrangements to an accurate and responsive accounting system. Still others exist to exhibit the works of others (both museums/galleries and performing arts centres could be included in this category). Their automated offices should allow them to maintain large inventories of objects, to schedule numerous events and to keep track of attendance or ticket sales on a

---

156. Ted Grusec, p. 21.

157. From James R. Taylor's paper, "The Computerization Crisis: End of a Dream or Threshold of Opportunity?", (reference footnote #24), pp. 5-6.

158. James R. Taylor, (reference footnote #24), p. 11.

159. James R. Taylor, p. 10.

continuous and accurate basis. In all cases, the price of inaccurate or inadequate information can be lost customers, decreased revenues, or increased costs due to mismanaged resources or failure to adequately penetrate target markets.

Consultation and Advice

The cultural "user" of office automation technology must be particularly insistent that his or her needs form the basis of the system design because most off-the-shelf software is still geared primarily to the business market. While an argument can be made that culture and the arts are also "businesses", one must remember that they are "businesses" with special requirements. Commercial inventory management software cannot serve the needs of either library or museum collection management. Nor is a standard accounting package likely to be applicable to the situation of a large performing arts centre with several auditoria and two to three hundred performances a year.

A thorough needs analysis should therefore be the first step in the office automation process for any cultural organization. As the Calouste Gulbenkian Foundation noted in its report, Computers and Arts Management, "This point may seem obvious, but in practice it is more honoured in the breach than the observance."[160] However, one should not assume that cultural organizations are taking an irresponsible approach to the question of automation. Rather, the problem of inadequate preparation is more often due to lack of money to hire expert consulting assistance or to lack of expert consultants themselves. Several examples drawn from actual office automation projects in Canadian cultural organizations serve to highlight the consequences of inadequate expert advice and the rewards of a well-planned project.

Late in 1983, the Winnipeg Art Gallery began planning an office automation system which would integrate its financial management, general ledger, accounting, fundraising and word processing operations. The initial system proposal, which had been prepared by a consulting firm, was rejected as unsuitable by the Gallery's management, which then embarked on a series of discussions with other consultants to investigate alternatives. The results were unsatisfactory: as one Gallery official put it, "They all wanted to sell something, and we felt we were unable to get unbiassed information about the best system for our needs."[161] Finally, a member of the Board of Directors, who was also a partner in a private consulting firm, stepped in and arranged for some free advice from his

---

160. Iwan Williams, p. 10.

161. Conversation with Mary Lou McGurran, Winnipeg Art Gallery, March 3, 1986. The information in this paragraph is drawn from both this conversation and from Cultural Initiatives Program files.

company. Early in 1985, five microcomputers were installed in the Gallery's offices. A year later, in early 1986, all functions are not yet "up" because of unanticipated delays in developing software (for the membership/fundraising function which could not work satisfactorily using off-the-shelf programs) and problems in integrating the hardware and software into one smoothly operating system.

The Periodical Writers Association of Canada (PWAC), because of lack of funds, had to adopt a "learn-as-you-go" approach to automation without the benefit of much consulting advice. In essence, PWAC bought computer hardware and software for its national office based on the fact that they were the brands most popular with Canadian freelance writers, then proceeded to learn how to use the system once it was installed in the office. This approach was not entirely without benefit. According to the Executive Director:

> Perhaps we should have simply defined our needs to a computer systems specialist and then waited for delivery of dedicated software. That method would have been more costly however, and I'm convinced we wouldn't have the same understanding we gained by slogging through the program manuals ourselves.[162]

The reverse side of this coin, however, was that the accomplishment of the project's objectives took twelve months instead of the six originally anticipated, and certain tasks remain to be completed. In addition, PWAC fell victim to an even more damaging problem: outright incompetence. In attempting to produce its 1985-86 Directory of Members from a computerized database, the organization hired consultants to design a program and instruct staff on how to use it. Unfortunately, the consultants were not experienced enough to complete the work and the PWAC staff had to terminate the contract and finish the project themselves using Wordstar, a word processing program, to enter data and DBase II, a database management program, to sort it.[163]

In contrast, the Canadian Periodical Publishers' Association (CPPA) did hire a consultant, with whom they were quite satisfied, to help design, choose and install the office automation system. In CPPA's case, the Executive Director spent a considerable amount of time before the project began reading about office automation, speaking to the staff of other cultural organizations that had already computerized and seeking advice about competent consultants. She finally chose one who had some knowledge of the CPPA's operations and who had been recommended by other cultural groups.

---

162. Personal correspondence from Norma Crawford, Executive Director, PWAC, December 13, 1985.

163. Norma Crawford, Final Report on the PWAC Development and Communications Project, Cultural Initiatives Program files, December 1985, p. 3.

Even with the assistance of a consultant, the project took about a year to develop and went through one major transformation. At the beginning of the process, the CPPA was convinced that it required a fully integrated multi-user system. However, as it explored both its needs and the "state-of-the-art" of integrated technology, it concluded that its day-to-day operations were not sufficiently interconnected to justify the extra expense and added complication of installing a multi-user or networked system. It settled instead for three standard hard disk-equipped business microcomputers, not interconnected. The Executive Director was particularly pleased with the consultant's role in obtaining special "deals" on hardware, software and peripherals, feeling that his fee could have been fully justified on this basis alone. She also felt that there was a definite need for someone to "translate" the user's expressed needs into language that hardware specialists and programmers could understand.[164]

Training

The results of the DOC field trial evaluations suggest that, despite vendor claims of "user friendliness", training to use office automation systems takes much longer than anyone originally anticipated. The learning curve can be very prolonged, to the point where one analyst has stated that "We are speaking here of months, perhaps even years, during which mission-accomplishing performance may decline from pre-implementation levels."[165] The experiences of a number of cultural organizations tend to support this finding.

The Winnipeg Art Gallery opted to purchase formal training services for certain staff members, such as the accounting personnel and the membership clerk (who had to learn how to enter and manipulate data on a custom-developed membership database program.) A development secretary was also trained to use the word processing program, but she subsequently left the Gallery, and no one else has been trained to replace her. Consequently, the word processing capacity of the system remains unused one year after installation. No management personnel have received training on the use of the system to date.

Gallery officials estimate that it has taken about twice the time to get the system running as originally anticipated. They suggest, as one explanation, that people working in arts organizations do not have the "mind set" to adapt easily to technology. They also believe that the technology itself is still "too cumbersome" to be easily adopted by the average office worker and cite the problems in developing a fully integrated financial

---

164. Conversation with Dinah Hoyle, Executive Director, Canadian Periodical Publishers' Association, March 5, 1986.

165. Ted Grusec, p. 24.

management system. On the other hand, they remain optimistic that the system will be fully functional within the next year.[166]

Officials of the national office of the Periodical Writers Association of Canada, as stated earlier, opted to learn their system "from the ground up". They concluded that "establishing computerized systems means learning a whole new language - a time-consuming process," and went on to add that, "In a sense then, this project is ongoing, and this "final report" should probably be sub-titled, "Phase 1"."[167]

One unusual aspect of the PWAC office automation project was the establishment of cross-country electronic mail links between the national office and the regional chapters. (See Section 6.1.E.3 for a detailed description.) Some money was spent to teach writers within each of the regional chapters how to use the electronic mail system. Even so, during the first six months of the project, telecommunications bills were much higher than anticipated and did not level off until most users had become adept at getting on and off-line.[168]

While national office staff did not have the benefit of formal training, there were a couple of factors which served as partial substitutes. One was the fact that the Executive Director was in a position to hire additional staff during the project implementation period to perform normal office duties while she devoted herself almost full time to installing the system and setting up the national network. Another was that a number of PWAC members were already seasoned computer users and generously provided free advice and counsel to both national office staff and the regional chapters whenever requested. The commitment to automation at all levels of the organization was high and, in part, compensated for the lack of formal training. Nevertheless, instruction for new staff promises to be a continuing problem. As the Executive Director pointed out, "Once the systems are set up, new staff has either to know about computers or go through a training program, which can be time-consuming. ... This could be a problem for smaller organizations with very limited salary budgets and not much time to train new staff."[169]

Larger organizations, such as the Canadian Museums Association, have supplemented formal training sessions during the project implementation stage with continuing in-house computer education workshops conducted by a knowledgeable staff member. The CMA has found it advantageous to designate one of its officers as Head of Computer Services with primary

---

166. Conversation with Mary Lou McGurran, March 3, 1986.

167. Norma Crawford, Final Report, pp. 1-2.

168. Norma Crawford, Final Report, p. 5.

169. Norma Crawford, personal correspondence, December 13, 1985.

responsibility for coordination and trouble - shooting of its multi-user, integrated system. This individual has observed that learning tends to "plateau" once staff has achieved an initial mastery of the system, and he now organizes regular "user group" meetings for other CMA personnel to ensure that they continue to develop their computer skills. The Executive Director of the organization believes it essential that one highly-motivated person in the office take on the system administrator role to prevent the equipment from being under-utilized or poorly utilized.[170]

In the Canadian Periodical Publishers' Association, the Executive Director has herself taken on this role. Although the office automation system has been in operation for two months, no formal training sessions have yet been held. A "learn-by-doing" approach has been adopted which, in the case of the word processing and spreadsheet programs, has proven to be effective but slow. Software was chosen, in part, on the basis of its ease of use and the quality of its documentation. Therefore, the more motivated staff members have acquired a fair degree of basic proficiency and are already beginning to undertake more complicated tasks. Others have not proceeded as quickly, but are encouraged to take as much time as necessary to work their way through software tutorials and to apply the technology in their daily routines. All staff members have been asked to contribute to the system documentation by inserting in a reference manual any information on procedures or applications that they may have discovered. On the whole, CPPA staff have viewed office automation as a positive experience, once past the "blame-the-machine" stage of initial learner frustration. The Executive Director indicates that all three microcomputers are now in constant use.[171]

Satisfaction with System

The DOC office automation field trials found that lack of system integration was the major barrier to efficient office computerization. Yet, even while users discontinued certain applications (such as messaging and searching of remote databases) they remained "uniformly positive to the idea of electronic office technology.[172] A Decima poll conducted in December 1985 confirms this overall positive attitude toward high technology in the workplace. Approximately half of those surveyed had been affected by the introduction of new technologies in the workplace, and fully 88 per cent of those affected rated the changes positively.[173]

---

170. Conversations with John McAvity and Raymond Bendall of the CMA, November 12, 1985.

171. Conversation with Dinah Hoyle, March 5, 1986.

172. James R. Taylor, p. 6.

173. DGSP Environmental Scanning, "Highlights of the Decima Quarterly Report; Public Affairs Trends", Winter 1985, p. 2.

Most of those office automation projects discussed in this section have been relatively small-scale projects and, with the exception of the PWAC network, have not involved electronic mail. Nevertheless, it is interesting to observe how the office automation experience of cultural organizations tends to parallel that of large government offices and to reflect the general attitudes of the Canadian public.

As indicated earlier, the Winnipeg Art Gallery has undergone a lengthy development and installation phase for its office automation project. It has had to overcome disasters, such as the accidental erasing of over 5,000 membership records from a microcomputer hard disk, and has still not trained all its personnel nor fully installed its integrated accounting system. Yet, it remains confident that all will be running smoothly by next year. The Gallery is even considering joining the Canadian Heritage Information Network and automating the management of its 14,000 collection records.[174]

The Canadian Museums Association also experienced a few frustrating moments early in its automation project. The first batch of terminals to be connected to its supermicrocomputer proved to be defective and had to be replaced by the supplier. This delay, coupled with initial staff unfamiliarity with the system, led to some morale problems at the beginning of the project. However, after a couple of months, usage had climbed to such an extent that access to the current seven terminals became a problem, and the CMA is now considering installation of additional work stations. In general, the CMA is well satisfied with its system, but feels that the process of automation took much longer than originally anticipated. The Head of Computer Services believes that "the potential of the system has barely been tapped" and he has plans to develop a number of machine-readable databases which could greatly benefit the museum community as a whole.[175]

Interestingly enough, this idea of "untapped potential" is also expressed by the Periodical Writers Association of Canada, which concluded that "the possibilities offered by the new technology are limitless." The sections above have already dealt in some detail with problems PWAC experienced as a result of inadequate advice and training. Nevertheless, in twelve months following the introduction of one microcomputer in its national office it was able to completely automate the production of its national newsletter, computerize its annual survey of freelance writers' fees, develop an on-line directory of members and process almost all of its correspondence, reports, minutes, grant applications and financial statements on the computer. The Executive Director is convinced that it has put PWAC on "the leading edge", and the organization is now planning additional projects

---

174. Conversation with Mary Lou McGurran, March 3, 1986.

175. Conversation with Raymond Bendall, November 12, 1985.

(some of them potentially revenue-producing) which have been made possible by the introduction of office automation technology.[176]

Like the other organizations discussed above, the Canadian Periodical Publishers Association, has had to contend with a number of equipment defects and shortcomings. For example, the new computers replaced an older and more limited one, using a different operating system, which was dedicated solely to the task of administering the CPPA's magazine distribution service. One of the priorities of the CPPA is to transfer this database/accounting system to one of the new computers, but since the operating systems are incompatible, this will be a fairly complex process. In addition, new software will have to be developed, incurring even more costs. The CPPA has also had to upgrade its monitors and office furniture as a result of automation because some staff were experiencing back and eye problems after extended periods at the computer. However, despite these problems (and many other minor complaints about both hardware and software), the overall assessment of CPPA staff is positive, many of them even expressing wonder as to "how we ever got along without the computers".[177]

A word about productivity...

The few case studies examined in this section would suggest that office automation in cultural organizations has for the most part had an impact similar to that in other types of organizations. However, there are some questions which still need to be answered. One concerns the degree to which office automation technology has been adopted by cultural organizations in Canada. Another relates to the impact of this technology on their modes of operation.

Cultural organizations would most definitely fall into the category of the "non-procedural office" - one which has the aim of achieving general missions and goals and where activities cannot be described as a set or sets of explicit steps.[178] Because of this fact, productivity gains due to office automation become extremely difficult to measure, and it only becomes meaningful to assess improvements in performance measuring the effectiveness of staff, rather than their efficiency. Ted Grusec, in his article on this subject, states:

> It is probably very unlikely, in non-procedural work, that office automation will result in reductions of staff at the professional level. Any efficiency gains which lead to time savings in an

---

176. Norma Crawford, Final Report, pp. 1, 2 and 10.

177. Conversation with Dinah Hoyle, March 5, 1986.

178. See Ted Grusec's article (reference footnote #155) for a discussion of procedural and non-procedural offices and the impact of office automation in each.

> activity are probably quickly absorbed by expanded efforts in other directions. Most professionals, and this is equally true of managers and executives, are responsible and accountable for accomplishments and goals achievements, not for the activities nor behaviours which are used to effect those achievements. This is a key point which virtually defines non-procedural work and places it out of reach of any output-input ratio definitions of productivity.[179]

Any measure of the impact of office automation on cultural organizations would most definitely have to take this approach. Certainly, the most common comment of cultural organizations that have (according to their own definition) "successfully automated" is that computer technology has allowed them to do more with existing resources. Few, if any, would likely be able to cite staff reductions or cost savings as a result of the change-over. This could be a demonstration of Parkinson's First Law, "Work expands to fill the time available to do the work required." Or it could indicate that cultural organizations, once automated, are able to perform useful work that would be otherwise impossible due to lack of resources. Only a more comprehensive survey can determine which speculation is correct. It may also provide insight as to what further technological development might improve the effectiveness of cultural organizations in the future.

6.3 Computerized Ticketing and Box-Office Automation

6.3.1 Overview

To begin with, it will be necessary to distinguish between "computerized ticketing" and "computerized box-offices" (also commonly referred to as "box-office automation"). The two terms are often used interchangeably, but within the specialized world of box-office managers, they mean two different things.

"Computerized ticketing" commonly refers to the service provided by ticket sales agencies - independent businesses which operate ticket sale outlets and/or a telephone sales service on behalf of a number of event producers or halls in the area. They charge fees both to the seller and to the buyer of tickets, and usually do business in a number of locations throughout an area. The performing arts account for only a part of their ticket volume: they are normally also heavily involved in ticket sales for sporting events.

"Box-office automation", on the other hand, refers to the computization of the individual box-office of each performance venue. Unlike the ticketing agencies, the box-office of a theatre or auditorium normally sells only tickets for events taking place in that location. However, while the volume and variety of tickets are less than those of a ticket sales agency, the in-house box-office computer system is usually expected to perform

---

179. Ted Grusec, p. 16.

processing tasks of greater complexity and scope. These include mailing list management, subscription list and fundraising management, performance status reporting and full accounting services.[180]

As in other areas of computerization described elsewhere in this paper, automation of the box-office and ticket-selling function is a relatively recent phenomenon. The first computer systems for ticket agency use were developed in the early 1970's. In-house box-office systems are of even more recent vintage, dating from about the mid-1970's.

In Canada, the major ticket agencies are:

(a) Ticketron

This is an American company based in New Jersey. Its primary Canadian outlets are in Montreal and Toronto. It offers a purchaser only a limited form of selection, allowing a choice of price range and general seating area but not the precise seat or seats desired. The sponsor of a performance receives only information on the sales status of the event.

(b) BASS (Best Available Seat Service)

This is an agency software package used by a number of separate independent companies, including the Vancouver Ticket Centre/Concert Box Office, BASS Alberta and BASS Polycom (which operates in the Toronto area). It also provides the customer with a limited form of seat selection, similar to Ticketron's. As well, it offers the performance sponsor a basic subscription mailing list service which prints renewal notices and seasons tickets on a high speed printer.[181]

(c) Ticketnet

A Canadian company, Ticketnet, is attempting to launch an ambitious, nation-wide system which will permit performance venues throughout Canada to list their events on a nation-wide or, possibly, continent-wide network tied in to the automated travel agency booking system.

Such a network would allow an individual from Vancouver to book tickets for a play or concert in Toronto at the same time as he makes his travel arrangements to visit the city.

---

180. The information in the preceding two paragraphs is derived largely from a study done for the National Arts Centre by David Clark and Gilles Lamarre, A Survey Report on the Status of Box-office Automation in Canada, Ottawa: April 1985, pp. 18-21.

181. David Clark and Gilles Lamarre, pp. 25-6.

The Ticketnet proposal is also revolutionary in the sense that it attempts to build linkages between the virtually separate spheres of computerized ticket agency and in-house box-offices systems. Besides providing an agency service to sell tickets throughout Canada and the United States, Ticketnet also intends to market a full array of management software comparable to that provided by the in-house box-office systems. The method of providing this service is unusual, involving leasing of all equipment and services rather than purchase of a total in-house system, which can generally cost anywhere from $60,000 to $200,000 depending on the size and complexity of the performing arts venue.

In Canada, Ticketnet intends to set up five Regional Computer Centres - in Montreal and Toronto in 1986 and in Vancouver, the Prairies and the Atlantic provinces in 1987 - which would act as computer service bureaux to meet the full ticketing and management needs of performing arts organizations. Access to the system will be through IBM or IBM-compatible microcomputers leased from Ticketnet. The role of the Regional Centres will be to provide central data storage of ticket inventories and other client information; the performing arts venues will have full control over data entry and manipulation. Essentially, they will be able to lease from a "smorgasbord" of management services, choosing as many or as few of the following services or software packages as they wish:

1) subscription management control;

2) "package" management control (ie. the putting together of "packages" of events at a number of venues);

3) databases of subscription, donation and payment information on the performing arts organization's clientele;

4) accounting and financial management reporting;

5) sales reporting;

6) fundraising and donation management.

All these features are designed to integrate with standard IBM-compatible, off-the-shelf software (such as word processing and spreadsheet programs), thereby allowing the individual performing arts organization to download information and manipulate it on its own if it so chooses. Ticketnet claims that it will have "fail-safe" central computers in its regional centres, ensuring that the system will never go "down".[182]

---

182. The information in the foregoing three paragraphs has been derived from a conversation with David Clark, Executive Director of Ticketnet Corporation, March 18, 1986, and from Ticketnet promotional literature.

(d) Uniticket

In June 1985, an affiliate of Ticketnet, called Uniticket, launched a computerized ticketing service in the National Capital Region, replacing the Ticketmaster system operated by the National Arts Centre for several years. Because of the high continuing cost of running the Ticketmaster operation, the NAC had been forced to act as an agency for other venues in the region. However, this proved to be a strain on resources, and the NAC decided to sell its ticketing interests to the private sector and to revert to the status of user only.[183]

Various types of in-house box-office automation systems have been installed in Canadian performing arts venues. The chief advantage of these systems is that they offer the producer/sponsor of performances a wide range of computerized services besides the simple vending of tickets. The chief disadvantages are that they are expensive and cannot readily be interconnected with the ticket agency systems described above. Some of the current in-house box-office automation systems in use include:

(a) Norwat Computer Systems (Cambridge Software Systems)

This is a Canadian company founded in 1975 and based in Cambridge, Ontario, which has achieved greater market penetration than any other domestic firm. It currently has systems installed in:

- The Confederation Centre of the Arts - Charlottetown
- Stratford Festival, Avon Theatre - Stratford
- Shaw Festival, Courthouse Theatre - Niagara-on-the-Lake
- Roy Thomson Hall - Toronto
- Massey Hall - Toronto
- St. Lawrence Centre (including CentreStage and Theatre Plus) - Toronto
- Royal Alex Theatre - Toronto
- The Grand Theatre - London

It has also sold systems to the Old Vic Theatre in London, England and to eight theatres and orchestras in the United States.

---

183. David Clark and Gilles Lamarre, p. 27.

A complete Norwat system can provide:

1) an on-line, single ticket reservation system (including accounts receivable);

2) an integrated subscription system (linked to the single ticket and membership development functions);

3) a development fundraising system;

4) a membership fundraising system;

5) mailing list maintenance;

6) word processing;

7) general ledger and financial reporting;

8) accounts payable;

9) payroll maintenance.[184]

(b) Arts Soft

This is a fairly inexpensive system developed by an American firm and marketed in Canada by Theatrelink of Kingston, Ontario. At present, it is known to be installed in only one Canadian theatre in Markham, Ontario.[185] The system offers the following features:

1) a single ticket and subscription service that can handle several halls simultaneously;

2) a fundraising module;

3) general ledger and financial report;

4) accounts receivable;

5) accounts payable;

6) payroll management;

7) inventory control;

---

184. Norwat Computer Systems, Outline of Computer Systems for an Arts Organization or Theatre Operation, September 1983, pp. 3-14.

185. Conversation with J. Mark Kelman, President of Theatrelink, January 8, 1986.

8) word processing;

9) spreadsheet functions.[186]

(c) C.A.T.S. (Computer Aided Ticket System)

The C.A.T.S. box-office system is designed to run on an IBM-PC microcomputer and is therefore more suited to the needs of small theatres than some of the other systems available on the market. At the moment, it is used by only a few performance venues, among them the Grand Theatre in Kingston, Ontario.[187]

The system is unique inasmuch as it uses a light pen (a device which controls data manipulation through direct contact with the computer screen) and a credit card reader to select seats and to arrange for payment. Seat availability is displayed on the screen and colour-coded to indicate status (white indicates the seat is available, blue indicates it is reserved and red indicates it has been sold.) The software can perform the following functions:

1) accounting and financial management of box-office receipts;

2) fundraising tasks (maintenance of databanks of donors and generation of letters);

3) mailing list management;

4) scheduling;

5) word processing. [188]

(d) B.O.C.S.

This is a system developed in the United Kingdom which provides most of the standard features of an in-house box-office system (such as accounting and fundraising) but which also permits remote computers to dial up and purchase tickets on a voucher basis. Therefore, B.O.C.S. has a limited capacity for ticket selling over a wider geographic area, somewhat akin to the capacity of the ticket selling agencies discussed above. The limitation lies in the fact that outside computers must know which system to dial up to purchase specific tickets. Therefore, the system tends to be used in Britain as a sort of regional "super system", performing cooperative ticket selling for a number of venues managed by the local authorities.

---

186. Art Soft, Box Office/Accounting Specifications, May 1985, pp. 2-12.

187. Cultural Initiatives Program files.

188. Cultural Initiatives Program files.

Because of the cost of the system it can only be considered by very high-volume theatres and arts centres. There are currently nine B.O.C.S. systems in the United States and none in Canada (although the Thunder Bay Community Auditorium is said to be considering purchasing one).[189]

6.3.2 Canadian Box-Office Statistics

Every year, the Council for Business and the Arts in Canada publishes a compendium of statistics on the revenue situation of performing arts organizations in Canada. In 1986, this survey included actual revenues and audience figures for 139 theatre, dance, music and opera organizations earning over $100,000 in 1984-85. Among these figures are box-office and earned revenues which reflect in a general fashion the magnitude of performing arts ticket sales in Canada.[190] Considered in relation to audience figures for the same year, they provide a "snap shot" of the commercial dimensions of the performing arts industry in Canada.

Table I
Overview of Performing Arts Box-Office and Earned Revenues and Audiences - 1984-85[191]

Provinces	Number of Organizations	Total Box-office and Earned Revenues	Audience Total Home	Audience Tour
Alberta	17	$ 9,448,287	732,370	306,002
British Columbia	20	12,390,886	1,102,839	662,754
Manitoba	10	6,840,886	475,436	206,313
New Brunswick	1	622,928	25,000	85,500
Newfoundland	5	477,378	142,504	4,538
Nova Scotia	5	1,361,902	98,581	108,389
Ontario	53	46,806,395	3,056,339	1,878,077
P.E.I.	1	1,188,143	105,568	N/A
Quebec	22	16,118,304	1,306,546	577,536
Saskatchewan	5	1,428,497	113,068	107,395
TOTALS	139	$96,683,606	7,158,251	3,936,504

189. David Clark and Gilles Lamarre, pp. 29-30.

190. The weakness of the CBAC figures in this context is that it includes not only box-office revenues but also money derived from guarantees, fees, commissions, concession sales, bank interest, rental income and special events.

191. From the Annual CBAC Survey of Performing Arts Organizations, January 1986.

A more precise but less current measure of performing arts activity can be derived from a Statistics Canada publication, Performing Arts 1981.

Table II
Attendance by Discipline
Performing Arts Organizations
1981[192]

Discipline	Number of Organizations	Number of performances	Average number of performances	Total Attendance	Average Attendance
Theatre	133	22,953	173	6,067,853	264
Music	48	1,893	39	2,036,781	1,076
Dance	22	1,604	73	1,201,898	749
Opera	6	552	92	379,931	688
Totals & Averages	209	27,002	94	9,686,463	694

A study carried out for the National Arts Centre in 1985 attempted to establish ticket volumes in Canada for a number of types of events. Using a complicated formula to correlate attendance figures (minimum, reasonable and maximum) and a multiplier (estimating numbers of sports and entertainment tickets sold in a region based on Canada Council figures for the performing arts), the study attempted to derive reasonable total ticket volumes for the purpose of predicting potential computerized ticket agency sales.

The definitions of the event categories used are as follows:

Performing arts - theatre, dance, music, opera and other events requiring subsidy from the public sector

General entertainment - personality shows, rock concerts, music festivals and other events promoted privately as profit-making ventures, benefit performances or tourist attractions.

Sports - major and minor league events, whether professional or amateur, for which an attendance fee is charged.[193]

---

192. Extracted from Culture Statistics, Performing Arts 1981 (Catalogue #87-524). Ottawa: Department of Supply and Services, November 1984, p. 10.

193. David Clark and Gilles Lamarre, p.8-10.

Table III
Total Ticket Volume Assumptions for Canada - 1985[194]

Category	Low Estimate	Reasonable Estimate	High Estimate
Performing arts	24,100,000	26,400,000	28,900,000
General entertainment	32,300,000	35,300,000	38,600,000
Sports	26,800,000	29,300,000	32,100,000
Totals	83,200,000	91,000,000	99,600,000

Using the "reasonable estimate" column as a base, the NAC study indicates that the performing arts represent approximately 29 per cent of the total paid ticket volume in Canada. When this figure is considered with the general entertainment category (which should still be of interest to DOC decision makers since the department is actively involved in supporting and promoting the Canadian popular music industry and so-called "cultural tourist attractions"), another 38.8 per cent in ticket volumes can be added into the equation. To summarize, therefore, 67.8 per cent or about 62,700,000 tickets sold in Canada annually are for cultural events, defined in their broadest sense. At present, the NAC study estimates that only 20 per cent of these tickets are sold by either computerized ticket agencies or automated box-offices, the implications of which are discussed below.

6.3.3 Future Directions and Opportunities

The relations between computerized ticketing agencies and the performing arts sector in Canada have been somewhat strained, to say the least. There is a generalized perception within the performing arts sector that the ticket agencies are not sensitive to their needs and are much more interested in selling tickets to high volume/low risk events such as football games and rock concerts than in developing software which would assist theatres, orchestras and dance companies to market their subscription packages and to meet their very complex financial reporting requirements. Moreover, the performing arts venue must pay a fairly high fee for the ticket sales services they do receive - 4 per cent or more for casual ticket sales and 3 to 3.5 per cent for season's ticket sales. Organizations outside the major urban centres also resent the fact that agencies often open outlets in their communities not to sell tickets for local productions but to promote ticket sales for events in the city.[195]

The existing ticket agencies usually respond that the performing arts represent only about 25 to 30 per cent of their business. While they

---

194. From David Clark and Gilles Lamarre, p. 11. The figures are based on a "reasonable attendance, minimum multiplier" assumption.

195. David Clark and Gilles Lamarre, pp. 37-39.

acknowledge that this 25-30 per cent is a component which gives the agencies credibility as overall ticket-vending enterprises, they resent the "fussiness" of typical performing arts clients and the difficulties of catering to the multiple small events typical of the milieu. The NAC study cited earlier summarizes some of the problems as perceived by the ticket agencies:

> Performing arts events have many more performances and smaller capacities. As a result, a computerized agency might have to set up 15-20 unique performance seating plans and pricing schedules, and carry out as many special day-of-show procedures and venue settlements to earn the equivalent of one major sporting event in terms of sales and fee revenues.
>
> Selling agency services to each venue may require a sales effort similar to that for larger organizations, but with a much smaller annual volume and corresponding profit potential. Typically an agency must deal with many small venues in an area.
>
> The performing arts venue is often a "fussy" customer, demanding that special attention be given to their customers regarding performance information and seat selection. ...Furthermore, demands are often made for subscription season packages of greater complexity than that required for sports, and for fund raising and other software mostly unique to performing arts.[196]

The situation with regard to in-house box-office automation systems is scarcely better. The best of the in-house systems (ie. those providing a full array subscription, fundraising and financial management services) tend to be beyond the reach of all but the largest of performing arts organizations. Capital expenditures in the range of $200,000 are not unusual, and because of the sophistication of these systems, continuing high expenditures on systems support and maintenance often result.[197] Faced with a complex, in-house data processing installation, most performing arts organizations have had to hire expert technical staff to keep the system up and running. In addition, the box-office automation companies themselves must spend considerable amounts of money to provide support to users who have bought their software. For example, the president of Norwat Computer Systems has estimated that fully one-quarter of the total cost of software provided by his company consists of user support services.[198]

The major problem with in-house box-office automation systems, however, is that they do not integrate well with the agency networks. A good deal has been said in this paper (particularly in Sections 6.1 and 6.2) about the system interconnection problems faced by other cultural users of new

---

196. David Clark and Gilles Lamarre, pp. 37-8.

197. David Clark and Gilles Lamarre, p. 22.

198. Meeting with Frank J. Jaglowitz, President of Norwat Computer Systems, March 12, 1984.

technology. The ticketing and box-office venue suffers equally (perhaps more) as a result of the communications inadequacies of current hardware and software. As the NAC study observed:

> ... a venue using one of these in-house computer systems will not easily be able to pass some or all of its casual inventory (ie. tickets remaining after a subscription campaign, to be placed on general sale) over to an agency system for sales over a wider area. Often long print-outs must be prepared for re-entry by the agency, a waste of everybody's time. An additional implication is that agency sales must be manually entered into the in-house computer each day to determine exact sales status.[199]

Despite this situation, considerable potential for improvement exists within the box-office milieu. The statistics quoted in Section 6.3.2 indicate that the Canadian public is a surprisingly heavy consumer of entertainment and cultural events. According to the "reasonable attendance" figures developed by the NAC study, between 3.3 and 4 tickets for performing arts, sports and live entertainment events are purchased by each Canadian annually. As leisure time increases due to a trend to a shorter work week,[200] this figure is almost certain to rise. More efficient marketing and ticket-selling therefore would appear to be an essential element of a strategy to increase the revenues of performing arts organizations from sources other than the public purse. As summarized by the NAC study:

> ... the continued growth and success of the arts and culture sector will depend not only on the quality of the content but also on factors which enhance the marketing "desirability" of attendance and the general availability of tickets. Efficient mailing campaign management, fund raising efforts, subscription service packaging and management, and widespread geographical ticket distribution are all relevant and contributing factors and are the business of the box office in conjunction with the marketing department. All of these are readily enhanced by computerization: indeed it seems to be difficult to imagine exploiting these various areas with any great success without the control and facilities which computers provide.[201]

How much can the situation of the performing arts be improved by computerization of the ticket-selling and box-office functions? As in many other areas of automation, productivity increases are extremely difficult to predict. The difficulty is compounded in the performing arts sector by statistical uncertainty. Various speculations can be made regarding the effect on earned revenues of increasing the availability of performing arts tickets over a wider geographic area. The Ticketnet Corporation, which is

---

199. David Clark and Gilles Lamarre, p. 23.

200. See Section 4.1 for a more detailed discussion of this trend.

201. David Clark and Gilles Lamarre, p. 43.

in the process of setting up a nation-wide, interconnected ticketing agency, has estimated that the net increase in business might range between 4 to 10 per cent.[202] Using the figures provided by the Council for Business and the Arts in Canada for the 139 largest performing arts organizations in Canada (Table I), which suggest that earned revenues are about $96.6 million, a 4 per cent increase would translate into almost $4 million in extra revenues, while a 10 per cent increase would result in nearly $10 million more. Including all 209 performing arts companies which reported to Statistics Canada in 1981 (Table 2) would undoubtedly increase these totals, but earned revenue figures for 1984-85 for all performing arts companies are not yet available from either Statistics Canada or the Canada Council.

Beyond the potential for putting more performing arts tickets on sale over a wider geographic area, there lies the possibility of improved marketing, subscription campaigns and solicitation of private donations through better and more extensive use of computer technology. As the NAC study indicates, only 20 per cent of performance venues are currently making use of any form of computer technology to carry out their ticketing and marketing operations. If, as the Ticketnet Corporation suggests, performing arts companies of all sizes and all areas of the country had access not only to cross-Canada ticketing services but also enhanced in-house box-office automation, would there be both better market penetration and market targetting? As with the Canadian Telebook Agency (discussed in Section 6.1.B) the answer is probably a tentative "yes", but the magnitude of the improvement will depend on the degree of penetration that can be achieved among the 80 per cent of Canadian performing arts venues currently without automated box-offices.

A third, and even less predictable, area of improvement relates to the "general entertainment" category, as described by the NAC study (Table 3). While a portion of this category consists of "personality" concerts by foreign artists such as Nana Mouskouri and Cleo Laine, and rock concerts by American "superstars" such as Michael Jackson and Bruce Springsteen, a fairly significant proportion of this business consists of Canadian events such as the Montreal International Jazz Festival, the Vancouver Children's Festival and concerts by Canadian rock stars such as Bryan Adams and Corey Hart. These ticket sales, which represent expenditures on "popular culture" as opposed to "high culture", are also relevant to the total Canadian picture, since they entail benefits for both the Canadian popular music and recording industries and the tourist trade. A scheme such as Ticketnet's, which would make tickets to popular entertainment and cultural events accessible through the travel agencies and in all regions of Canada and the United States, obviously could be a powerful tourism promotion tool. But, once again, there is little way to measure the potential impact, since the NAC study's estimate of 35 million general entertainment tickets sold in Canada annually is based only on educated guesses projected from data on the performing arts collected by the Canada Council. Moreover the proportion of this ticket volume which is accounted for by Canadian entertainers and events is unknown.

---

202. Conversation with David Clark, March 18, 1986.

The computerized ticketing and box-office automation field is currently in a state of flux, due largely to a new player in the game, the Ticketnet Corporation, an Ottawa based company which was formed in 1985. The principals in this company were the same consultants who carried out the NAC study, (which was partially funded by the Department of Communications) to evaluate the status of automated ticketing and box-office management in Canada. Both the Department of Communications and Ticketnet appear to have benefited from the information derived from this study. Certainly, Ticketnet has used the feedback and comments it received from performing arts organizations throughout Canada to put together a package which proved to be the star of the BOMI (Box Office Management International) conference held in New York in January 1986. In the words of Francine Grimaldi of Montreal's La Presse, "Lancé au BOMI ... à New York Ticketnet a fait l'effet d'une bombe."[203] Apparently, this view is also shared by American observers:

> Despite the high degree of optimism by various exhibitors and box-office reps at the BOMI convention, there is a belief among many that some computerized box-office systems may be shaken out by the turn of events. A third generation of computers may be on the way, and some feel that retooling for the new era may be too much for some of the present firms. A comparatively new company from Canada, Ticketnet, has come on the market with an elaborate system which can do many chores in many locations simultaneously and believes that the technical advances may be too much for some now on the market. Reflecting the opinion of many of the computerized companies, the machinery is being required to do more and more chores, and so research and development in some firms may be insufficient. That may be a factor that could lead to the demise of some companies.[204]

The Department of Communications may have played a modest role in launching Ticketnet but there are some more general issues to be drawn from its example to which the department should turn its attention.

One of these issues concerns the availability of venture capital for high tech companies such as Ticketnet which are attempting to fill a niche in the cultural and entertainment markets. The Executive Director of Ticketnet estimates that about $3.5 million had to be raised for research and development prior to the launching of the company.[205] This proved to be a difficult task which would have undoubtedly been made easier if an organization such as the proposed Canadian Cultural Investment Bank (see Section 5.1, recommendation 5) had been in existence to help lever the funds from the private sector.

---

203. Francine Grimaldi, "Ticketnet, une bombe!" La Presse, 5 mars 1986, section C.

204. Joe Cohen, "Automation Dominant Tool for U.S. Box-offices: Confab Show Exhibits Paced by Computers", Variety, February 5, 1986, p. 147.

205. Conversation with David Clark, March 18, 1986.

Ticketnet is actively promoting its product in the United States and, according to the Executive Director, has been receiving an enthusiastic response. Nevertheless, some form of marketing assistance from the federal government could also be of benefit to this type of venture.

Some of the points made in the NAC study with reference to potential DOC activities in the automated box-office and ticketing sphere are also relevant. The study made a number of recommendations which are consistent with the spirit of those being proposed in Section 5 of this report. These are:

1. DOC should view efficient box office and ticket distribution operations as important means of enhancing the market penetration and success of cultural activities in Canada, and consider the provision of financial and organizational support where appropriate to these box office activities.

2. DOC should set up mechanisms to develop and maintain a precise awareness of performance and event statistics, ticket sales, and other measurements related to the industry in Canada. This should be carried out for all sectors so as to put the cultural and performing arts sector in proper perspective in relation to the total.

3. DOC should continue regular dialogue with existing regional and national performing arts organizations, and should encourage the formation of such groups where necessary in various regions, for the specific purpose of addressing the possibilities for box office and automation assistance most relevant to each region as well as to the nation as a whole.[206]

Recommendation 2 has a great deal in common with the problems outlined in Section 6.1.D.3 regarding the lack of current data on the film and video markets. Both film/video and performing arts/entertainment events represent potential growth industries in an increasingly leisure-oriented society. However, Canada is in the awkward position of not knowing (a) how large its current markets are, (b) at what rate they are growing and (c) where future market opportunities might lie. The Canada Council and Statistics Canada perform a credible job in the area of the performing arts, although statistics tend to be at least three years old before they are released. However, data on popular music events and festivals appear to be non-existent, except in the Province of Quebec which requires sales tax reports to be filed from which can be gleaned exact attendance counts.[207]

It is doubtful that DOC can consider the NAC report's other recommendations (which include per-ticket subsidies, software development subsidies and software testing) until further dialogue is carried out with the performing

---

206. David Clark and Gilles Lamarre, p. E5.

207. David Clark and Gilles Lamarre, p. 7.

arts community and some more reliable statistics are available. Evidence would suggest that the private sector is actively and fairly successfully fulfilling the basic ticketing and box-office needs of at least part of the performing arts sector. However, certain areas, such as system interconnection, software performance and market penetration, obviously have much room for improvement. DOC should focus on how it can help the user community and the private sector to overcome the remaining problems.

6.4 Computerized Lighting Systems

Computerized stage lighting systems belong to a category of technological applications in culture and the arts which cannot clearly be considered as either creative or administrative. The lighting designer is unquestionably a creative person whose talent and expertise can make or break the success of a performing arts event. As one lighting designer for rock music concerts has stated:

> In the past, people bought concert tickets because the artist had a hit record, and it didn't matter as much what the show looked like. But now, everybody has to start with a reasonable visual presentation, because the audience expects it. They're more visually-oriented. If there's no thought put into the visual, an audience is likely to feel as cheated as they would have a few years ago if they couldn't hear the hit single because the sound system was bad.[208]

A lighting system therefore is a necessity in most performing arts events, as essential to the business of theatre, dance or opera as a good accounting system or box-office manager.

"Serious" theatre and opera-goers may not be as interested in visual pyrotechnics as the average rock fan, but a computerized stage lighting system is no less a creative tool for designers working in these milieux. In addition, computerized systems hold out the promise of considerable cost savings since they can potentially eliminate a good many of the separate lights now required for stage productions, as well as the expense of technical labour normally required to move and re-focus conventional lighting systems from one production to the next (or, in the case of especially elaborate productions, from one act to the next). In this sense, then, computerized lighting systems represent an investment which will permit the performing arts organization to deliver its product both more efficiently and more effectively.

How is this possible? First of all, it may be helpful to review the process by which the lighting for a performing arts event is designed, placed and manipulated.

---

208. Allen Branton, quoted in "Getting David Bowie on the Road", Lighting Dimensions, May-June, 1984, p. 45.

Design

When a production is in the planning stage, a lighting director must work closely with the technical director, artistic director, producer and general manager to develop what is known as the lighting plot. This plot can range from the relatively simple to the extremely complex, depending on the nature of the production. However, it involves such factors as light placement, focus, intensity, colours and ongoing adjustments during performances. This can be a relatively straightforward process if only one production is scheduled for one stage over a fairly lengthy period of time. However, if a company or an artist is touring, allowances have to be made for set-up and take-down time and for various adjustments that have to be made for different performance venues. No two halls or auditoria are exactly alike, and if the company is travelling with its own lighting equipment, it will inevitably have to hang lights in slightly different positions because of structural variations. If it does not have its own equipment and relies on the lighting system already installed in the hall, it will almost certainly have to make compromises dictated by the existing set-up. The lighting director's task is to ensure that, in all cases, the lighting plot conforms closely enough to the performance "ideal" to avoid compromising artistic integrity.

Placement

Stage lights do not automatically come to rest in the spots where they are most effective. Generally, the lighting director and the lighting crew have to make multiple adjustments as rehearsals proceed, experimenting by moving lights here and there, changing focus, changing colours, until the production manager and director are satisfied that the correct effects have been achieved.

In certain settings and with certain types of productions, the lighting designer may have the luxury of a full rehearsal of the lighting plot. In others, he (or, more rarely, she) may almost literally have to guess what the performer or performers will require. The 1984 production of Wagner's The Ring of the Niebelung at the Richard Wagner Opera Festival in Bayreuth, West Germany was an example of the "organized" type of situation. Lighting design took place in the last six weeks of pre-production and was finalized over an eighty-hour period of lighting and dress rehearsals. There was one lighting set-up rehearsal and three rehearsals of each act.[209] In the considerably less predictable environment of the touring rock show, lighting designers are not generally so lucky. The designer of David Bowie's "Serious Moonlight" tour in 1983 went through a lengthy period of time trying to get information beyond basic set design and numbers of performers on stage. Finally, the production company could wait no longer:

---

209. Michael F. Ramsaur, "The Staging of Wagner's RING", Lighting Dimensions, (date unknown) 1984, p. 48.

> ... about three weeks before rehearsal, the entire production staff met in San Francisco at FM Productions, who had been awarded the set contract, to talk about the show as a whole. My part was most incomplete at that point. So at this meeting, Showco's people pushed me off into a corner and said, "Look, we have to have this lighting design now." Since everybody was together, I got as much information as I could, got a fuzzy picture of how the band was arranged, and hung the lights accordingly. I stayed at FM for two days and finished the design. If I waited another week to get answers to all my questions, I wouldn't have given the vendor enough time to put the thing together in a coherent fashion. There was this balancing aspect to it, so I just gave it my best shot.[210]

The complications of lighting placement can become truly formidable in a setting such the Olympic Arts Festival in Los Angeles where more than 400 performances, exhibitions and special events took place over a period of two and a half months. An example from the theatre venue is illustrative:

> Though each house was as well equipped as possible prior to the Festival, each show called for a lot of reworking. "It was almost like hanging all new plots," said DiSantis (technical director and production manager for the theatre). "At the Studio space, where we opened Théâtre du Soleil, they wanted only 2K and 5K Fresnels, and nothing else. The lighting, the seating, and the stage were completely built for them, all straight on. But in three days we had to shift everything 45 degrees to meet the requirements of the National Theatre of Greece. All the light pipes had to be rehung on a diagonal, and they wanted all 6 X 16 and 6 X 22 lekos, so every Fresnel had to come down."[211]

Manipulation

Once the lights are hung, they must be continually refocussed and dimmed (either up or down), with certain special effects added in the more sophisticated productions. It is in this area where most computerized lighting systems have had an impact because they provide a precise means of controlling the sequence of dimming, focussing and, in some cases, moving a light during the course of a performance.

In most conventional systems, the lighting cues are controlled manually by a technician through a lighting control console, which is essentially a circuit board to which all the lights in a house are wired. Through this device the intensities of individual lights or banks of lights can be controlled from a central location. Each light or set of lights is hooked through a "patch" to a separate dimmer, and each dimmer has a number of controls which allow the lighting levels for the next cue to be set up

---

210. Allen Branton in "Getting David Bowie on the Road" (reference footnote #208), p. 39, p. 41.

211. "Lighting an Olympiad of Art", Lighting Dimensions, September-October, 1984, p. 38.

while the previous scene is in progress. In large non-computerized theatres there may be as many as 20 sets of controls for each dimmer, meaning that during a performance "while one person runs the master console, as many as five or six technicians shuttle back and forth between control panels, setting cues from lighting instructions on index cards or special cue sheets and manually adjusting the many subtle lighting shifts."[212]

Computerized lighting systems automate this process by allowing the lighting designer to program the cues in advance. This information, either stored in the computer's memory, or on an ordinary floppy diskette, can be used to operate the dimmer channels on the control boards in an exactly timed sequence. While this does not eliminate the need for a main console operator (most systems permit manual overrides when unforeseen problems arise), it does reduce the number of support personnel and simplifies the cueing task, particularly when complex special effects requiring split-second timing are requested. The more sophisticated the computer system, the more complex the effects can be, but replication on another system is not necessarily guaranteed, as the lighting director at the Olympic Arts Festival discovered:

> "The San Francisco Ballet uses an Avab computer in their house, and it does a lot of things they love. When they came here for the Olympic Festival, they wanted to get the same effects on our Light Palette (a Strand Century Light Palette, another brand of microprocessor). They said, "We need the lights to breathe." Their designer had five different sets of lights dimming up and down at different rates, pulsing in and out from a level of about five to eight. It was hardly visible, unless you stared at the floor and knew what to look for. The Palette is not meant to do that, and it took Jack hours to talk the board into doing it, with a combination of follow-on cues and holds and reprofiling cues and effects - it took up all six manual faders on the Palette, because each one was doing something different. It's supposed to be impossible. But I have the disk at home to prove it."[213]

There is little doubt that the creative capacity of the lighting designer has been enormously enhanced by computer technology. As illustated by the foregoing example, besides ensuring precision, computerized lighting systems also allow the designer to save and replay particularly creative lighting plots. Because the computer can control as many as two or three thousand cues, the lighting designer can construct effects that would have been impossible with a manual system. Each light, as opposed to each bank of lights, can now have a separate dimmer, allowing for extremely subtle sequences of light and colour changes such as sunsets stretching over twenty minutes.[214]

---

212. Charles Drucker, "The Lights of Illusion: Computers in the Theatre", Computerland Magazine, January-February, 1986, p. 33.

213. Nancy Hood quoted in "Lighting an Olympiad of Art" (reference footnote #210), p. 43.

214. Charles Drucker, p. 31.

Some systems also have the capacity to focus and shift the position of lights from a remote location. This is another area where the potential cost-savings are enormous. In some elaborate but non-computerized settings, such as the Richard Wagner Opera Festival mentioned earlier, eighteen electricians are required during every performance to ensure that all lights are correctly placed and focussed:

> Because of the rotating repertory schedule, the lighting instruments remain relatively fixed and are moved only under extreme need. But refocussing is continuous. Adjustments are made every act break, and sometimes during scene breaks with the curtain lowered. The lighting staff has between one and two hours to set up and focus the 200-odd instruments for each performance.[215]

Computer-controlled light movement and focussing therefore could reduce the amount of expensive technical help required to mount a production. However, use of this technology appears to be more common in nightclubs and at rock shows than in the traditional performing arts. One Vancouver nightclub has $125,000 worth of high-tech lighting equipment which, through the use of computer-controlled motors can swivel "... over, under, sideways, down, backwards, forwards, square and around 360 degrees."[216] Special effects, such as neon volcanoes, plexiglass palm tree leaves which pulse in time to the music, glitter strobe lights and laser-like beams from a four-pod high-tech lighting device suspended from the ceiling, are continuously shifted and "layered" from a single control board by one lighting technician. The lighting designer for the aforementioned David Bowie tour credited the use of just 40 movable, computer-controlled lighting instruments with economies of both time and money:

> Because we had the Vari-Lites, we had the ability to build up any look that we wanted in five minutes. The Vari-Lites gave us the freedom to block the show in any fashion Bowie might choose and have the lighting follow along right behind. With conventional instruments, we would not have been able to get as much work done if Bowie had to stop and wait for me to go up and focus this and get that. Looking back, we couldn't have had the show we had without Vari-Lites. We couldn't have hung enough conventional lights over the space to get all the looks we got.[217]

A fledgling Canadian firm, Paean Productions, which is attempting to develop and manufacture an automated movable lighting system for the traditional performing arts market estimates that the over 300 conventional lights installed in the Pasadena Civic Centre for the Olympic Arts Festival

---

215. Michael F. Ramsaur, p. 45.

216. Neal Hall, "The Fantastic Light," The Vancouver Sun, January 19, 1986, p. C-1.

217. Allen Branton in "Getting David Bowie on the Road", p. 41.

could have been replaced with just 60 to 80 of its own lamps to achieve the same effects.[218]

To summarize, the use of computerized stage lighting systems, while not currently widespread in traditional performing arts venues, can have significant creative and cost benefits, since they allow the designer to do much more with much less. Certain additional developments, described below, hold the promise of even greater pay-offs in the future.

Putting it All Together

Computerized stage lighting systems come in two varieties - the specialized lighting consoles sold by major theatrical suppliers such as Kliegl and Strand Century and the microcomputer-based systems developed by firms such as Westar Corporation. The former have all the "bells and whistles" but can range in price anywhere from $10,000 to $40,000 (U.S.).[219] Complete microcomputer-based systems, on the other hand, can be had for about $5,000 (U.S.). Such systems cannot perform all of the fancy tricks of a specialized lighting console, but they are generally adequate for a small theatre's needs and are certainly an improvement over the organized chaos of a conventional stage lighting booth. Another advantage of the micro-based systems is their versatility. Specialized lighting consoles can do only one thing - control lighting. An Apple or an IBM-PC can do other tasks in the theatre when it is not cueing the lights:

> Many theatres and colleges ... use computers to help run the box-office or the accounting department during the day, then carry them to the light booth at night to run the show.[220]

In the foregoing discussion of the lighting design and implementation process, it may have struck the reader that a fairly limited approach has been taken thus far to the problems of computerized lighting control. Most attention to date has been focussed on the storage and retrieval of lighting cues, an application which has certainly been useful to designers but which has not taken full advantage of the computing power of microprocessors. One survey of computer applications in the arts noted:

> Another possible application for computers in lighting is one that this author has yet to see: the use of a simulation program to aid the lighting designer to see the effects of particular sequences and combinations of lights ahead of time, on a high resolution video screen. This would enable him or her to play

---

218. Douglas M. Barker, The Litomation Concept, a project proposal submitted to the Cultural Initiatives Program), no date, p. 3.

219. Charles Drucker, p. 33.

220. Charles Drucker, p. 33.

the "what-if" game without taking valuable production time when cast and crew are present.[221]

In fact, there is research and development underway to address the issue, and this work is being carried out by a Canadian company, Paean Productions of Kitchener, Ontario. This firm has set out to tie together and improve existing technologies to provide an overall package which would address the theatre design and lighting needs of the performing arts from pre-production right up to performance. It is an intention comparable to that of Ticketnet (described in Section 6.3) which will be offering not only ticket-selling but box-office management services to its clientele, thereby linking two technology applications that have up to now, been completely separate and incompatible.

Paean Productions calls its concept Computer Integrated Pre-production and Performance (CIP/P). This system would allow the production team for a performance to produce a model of the stage on the computer screen, design the sets and props for the performance and then focus the lights to suit that stage layout. The lighting cue information would then be calculated by the computer, relayed to the lighting control console (called the Litomation system) and, subsequently, downloaded to the lamps. The lamps themselves would be fully automated to permit remote focussing and movement, rapid selection of sixty colours from just one lamp, and a variety of special effects. The master control console would be comparable to other products on the market, offering up to 1024 cues for up to 256 individually addressable lamps. It would also come equipped with a remote module that could be carried on-stage by the lighting designer to allow him or her to focus the lamps from there if need be.[222]

The Paean Productions strategy is clearly aimed at traditional performing arts venues, particularly the high-end, high volume house that require sophisticated, subtle effects for a great many productions. Within that market, however, it offers some highly attractive features including:

1) lamps designed for a traditional stage setting and not just for night-club or rock concert special effects;

2) better lighting effects with potentially fewer lamps;

3) a CAD (computer-aided design) system which can design an entire production (including set design, stage layouts and lighting cues) without having to involve a single stage crew or cast member and without turning on a single light;

4) labour cost-savings due to the need for fewer technicians to cue, move and focus lamps;

---

221. David A. Butler, "Applications for Computers in the Arts," Proceedings: 5th Symposium on Small Computers in the Arts, Philadelphia: IEEE Computer Society, October 5-8, 1985, p. 83.

222. Douglas M. Barker, pp. 1-3.

5) possible remote manipulation of stage machinery through the main lighting console (the assumption being that if the computer can manipulate lamps, it can also control the movement of cranes, platforms and other devices.)

This system was to have been installed at the Canadian Pavilion at Expo '86 in Vancouver to simplify and streamline the planning and staging of some of the many performances to be showcased during the fair. However, the system could not be developed on time due to manufacturing delays, a situation which has compromised Paean's plans to raise venture capital to go into full production of the system based on a successful working prototype installed at the Expo site.[223]

Notwithstanding the setback at Expo, Paean Productions is actively seeking private sector backing to finance further development and production of the CIP/P-Litomation system. Despite numerous approaches to potential funding sources, only one British company has expressed an interest in the project. The President of Paean Productions would prefer to keep the technology in Canada, but has found it extremely difficult to raise the backing he needs in this country. As he puts it, "I don't want free money. All I want is a chance to make my own!"[224] His experience, like Ticketnet's (see Section 6.3) highlights the need for a federal government instrument such as the proposed Canadian Cultural Investment Bank to provide initial backing, loan guarantees and other services to promising Canadian firms with potentially marketable high technology products and applications in the cultural field.

Paean Productions sees a potential market for the product:

> ... in such places as the Canadian Pavilion at Expo '86 and the new opera houses in Paris and Toronto. Retrofits are possible in existing halls such as the Festspielhaus in Bayreuth, West Germany. Because of the fact that all the halls in New York City rent lighting equipment, the Litomation system is ideal for a rental house in New York. In Japan, all the shows tour and do not carry production equipment, but rely on the house to have the facilities in place. Supplying all the halls with Litomation systems would make this style of touring more economical.[225]

Such conjectures are untested at this stage, but it is probably not unreasonable to assume that a system which succeeded in capturing the interest and initial backing of the officials in charge of cultural programs and special events at Expo '86 would hold potential for marketing on a wider scale.

---

223. Conversation with Douglas M. Barker, March 21, 1986.

224. Conversation with Douglas M. Barker, March 21, 1986.

225. Douglas M. Barker, p. 12.

It is not the purpose of this paper to promote specific companies or applications, but rather to illustrate with examples and case studies the extent of high technology development and utilization in the cultural field within a number of distinct areas. Computerized lighting systems (as well as computerized ticketing and box-office automation) happen to be two spheres where Canadian entrepreneurs are known to be active. The discussion could have focussed in details on other companies, such as Alias Research Inc. of Toronto (briefly referred to in the Introduction to this paper) or Omnibus Computer Graphics also of Toronto, both of which are recognized world leaders in the field of computer graphics and animation. The point is that many highly skilled and creative Canadians are prepared to undertake ventures which could not only enhance the quality of indigenous culture and the arts but which could also create jobs, boost exports and perhaps lead to economies or improved productivity. Many of these opportunities may go unexploited, however, without a clearer commitment by the Department of Communications to encourage and support those companies that are prepared to undertake high technology innovations to serve perceived markets in culture and the arts.

6.5 Cultural Uses of Telecommunications, Videotex and Optical Storage Technologies

6.5.1 Introduction

The topics being discussed in this section are elements of a technological development often referred to as "electronic publishing". They are being examined here in a discrete and somewhat isolated fashion for two reasons.

First, the subject of electronic publishing takes in a much broader range of activities than the strict focus of this paper, which is limited to the cultural concerns falling within the mandate of the Minister of Communications. Electronic publishing has potentially wide applications in business, education, and government, as well as in the entertainment and cultural industries. However, it is beyond the scope of this paper to examine the impact or potential impact of this form of communications on the first three areas. Only those non-cultural developments having possible relevance for the cultural sector will be considered at any length.

Second, the term "electronic publishing" is broad and somewhat nebulous. The generally accepted definition refers to "the merging of the traditional publishing processes of information assembly, reproduction and distribution with the rapidly evolving technologies of telecommunications, electronics, micro-electronics, digital storage, computer hardware and software.[226]

---

226. The Institute for Graphic Communication Inc., Opportunities in Electronic Publishing, Boston: Institute for Graphic Communication, Inc., 1984, P. I-1.

This, however, can encompass everything from a remote on-line database offering access to stock market information to a laser videodisc of "Asteroids" playing in the neighborhood video arcade. There are certain dangers in focussing too narrowly on specific media for electronic publishing: one can easily be blinded by the seductiveness of the medium itself, ignoring such crucial matters as demand, technological appropriateness and even content. On the other hand, all electronic publishing must take place through a medium because the base elements of the process - digital impulses - are meaningless to human beings unless translated by computers and inscribed in a more permanent format.

The question of format or media is therefore not trivial. As electronic publishers are discovering, incorrect assumptions about the acceptability of various types of electronic media can be extremely costly. The early enthusiastic proponents of office automation predicted a paperless office within a decade, but we are more immersed in that particular medium than ever. At least one professional consulting organization specializing in electronic market intelligence has recommended that future electronic publishing initiatives concentrate primarily on hard copy (ie. paper) for published material because users have emphatically indicated their preference for this form of output, except when scanning finding aid material such as indexes or directories.[227] For applications in business and research, at least, it would appear that rumours of paper's demise are somewhat premature. But what about in culture?

This question is not easily answered because, as illustrated by the many examples cited in this paper, information applications in the cultural sector can take many forms. Section 6.1 of this paper, which deals with cultural databases and networks, describes the various working experiments that have taken place over the past few years to arrive at a practical means of producing, storing, distributing and displaying electronically-based information within specific cultural disciplines.

Telecommunications has been the common element in all these "electronic pulishing" ventures. One might argue that telecommunications is a vehicle rather than a medium for cultural content. However, with the increasing convergence of digital and communications technologies, it is becoming difficult to separate the vehicle from the content. Words and images become "dematerialized" in an electronic environment, and the existence of valuable "content" no longer depends on the presence of hard copy or even, in some cases, of permanent or semi-permanent storage media such as computer disks. For example, an inter-library loan electronic mail message on the Canadian Library and Information Network (see Section 6.1.A) may exist only within the telecommunications medium, yet content is exchanged and a service is performed in spite of this fact. Or, to cite an even more

---

227. Opportunities in Electronic Publishing, p. IV-10.

striking example, a simultaneous musical performance, involving musicians from several countries, can be broadcast by satellite throughout the world. Yet, unless a videotape or audiotape record is kept, the entire performance will exist only at that moment and only in the form of a broadcast carried on the extraterrestrial telecommunications system. In spite of its ephemeral nature, therefore, telecommunications will be treated as a medium of cultural expression for the purposes of this paper.

The other two subjects of this section - videotex and optical storage technologies - have been selected for different reasons. As stated in the Introduction (Section 1) of this paper, the scope of technology's impact on culture is so broad that only a selective approach can be taken in any examination of the phenomenon. Any of a number of digital/electronic media could be considered because artists and cultural organizations are using them all. However, videotex suggests itself readily because of the Department of Communications' close involvement with Telidon (a particular type of videotex) and because of the high hopes that have been attached to videotex as both a cultural and a commercial medium. Optical storage technologies, on the other hand, represent a type of media that has only recently captured the attention of both the high technology industry and potential cultural users. Videodiscs (one type of optical storage medium) have been commercially available for several years, but have not yet found the mass market originally envisaged for them. Compact discs with capacity to deliver digital data (commonly known as CD-ROMs) are a much more recent development and have been attracting a great deal of media attention of late. They occupy much the same position as did videotex six or seven years ago, when wildly optimistic predictions of the technology's transformative effects and societal impact circulated widely in the press. An examination of both these media therefore offers some interesting comparisons and possibly, some valuable insights on the suitability of specific media for various cultural applications.

6.5.2 Telecommunications

For most of society, telecommunications is simply the carrier of content. The telephone is considered a utilitarian device, useful for exchanging information at a distance, but it is not seen as an instrument for creative expression. The cultural community, however, has developed a special relationship with the medium of telecommunications. To understand this relationship, which has a bearing on the discussion of videotex and optical storage technologies as well, it will first be necessary to explore the nature of telecommunications as a medium and to situate it within the evolutionary development of communications in society.

The appeal of telecommunications for most creators lies not in its potential to deliver standardized content to a mass audience (although the widespread use of the satellite telecommunications system for broadcasting network television and radio programs is currently the dominant cultural use of the medium). Far more interesting for most creators is the capacity for interactive, point-to-point communication of customized content through

the telecommunications network. This bias is hardly surprising in light of the heavy emphasis on original content demonstrated to date by most cultural applications of technology and the reluctance of most cultural practitioners to accept centralized domination of any medium of expression by either one or a handful of parties. This focus on the personalized "message", as opposed to the standardized "document", has become more intense in recent years as the advent of digital technologies have provided the means to customize information output (content) rapidly and at exceedingly low costs.

The telecommunications system is both the precursor and the ongoing instrument of this basic shift in societal communications. Paul Strassman, a vice-president in Xerox Corporation and the author of Information Payoff: The Transformation of Work in the Electronic Age, has observed that:

> ... the telegraph and the telephone, which I consider the precursors of the electronic communication networks, were also the first practical, systematized electronic means for the delivery of point-to-point messages. Here we have two inventions which embody the essence of the electronic medium. The first application of the telegraph and the telephone took place more than a hundred years before the ultimate role of the electronic message in the transformation of society began to become apparent.[228]

It is probably unwise to go overboard, as so many have done, when speculating upon the potentially transformative effects of the electronic media (in all its forms) on society. The rhetoric of the "technological sublime", a term coined by the American scholar Leo Marx to describe the rapturous tributes to steam and mechanics in the nineteenth century, continues to be used in the present day by such widely respected writers as Marshall McLuhan and Alvin Toffler. One must be cautious about accepting that new communications technologies can lead to widespread decentralization and democratization of social life, as many have suggested. These are only potential benefits which are not inherent in the technology itself but which must be nurtured by deliberate and carefully planned political strategies and institutional arrangements.[229]

---

228. Paul Strassman, Information Payoff: The Transformation of Work in the Electronic Age, New York: The Free Press, 1985, p. 227.

229. An extensive and thoughtful review of the history and implications of the "technological sublime" movement as a forerunner of today's predictions of an electronic utopia is contained in two articles by James W. Carey and John J. Quirk entitled "The Mythos of the Electronic Revolution" which appeared in The American Scholar, Volume 39, Numbers 2 and 3, (Spring and Summer), 1970. The central thesis of these articles in turn, owes much to the seminal thinking and scholarship of the Canadian economist and communications theorist, Harold Innis.

On the other hand, while recognizing the need to maintain a balanced and pragmatic attitude toward hyperbole from all sources, an observer of the current communications scene cannot remain blind to the increasing volume and variety of information flowing back and forth through the global telecommunications system. A part (perhaps the greatest part) of this flow continues to consist of the "broadcast" media and will probably remain so for a long time to come. As Marshall McLuhan observed, "... the content of any medium is always another medium. The content of writing is speech, just as the written word is the content of print, and print is the content of the telegraph."[230] There is, however, a fundamental difference between broadcasting and the increasingly specialized uses of the telecommunications medium sometimes referred to as "narrowcasting". In comparing electronic messaging with radio and television broadcasts, Strassman suggests that the former "... is an outgrowth of the flexible and personalized services of the telephone while the latter are in the final phases of centalized control."[231] He adds that "radio and television are the terminal forms of an evolution that began with printing" and that printing, as the first of the mass media, evolved as the medium of choice for industrial society because it was the most efficient means to "stimulate increased consumption of goods or increased penetration of political ideas."[232] This is not to suggest that printing or broadcasting will disappear. It does mean, however, that attempts to utilize digitally based telecommunications services as vehicles for unidirectional mass marketing, news, advertising, entertainment or education are unlikely to be successful because they ignore where the strength of the medium lies.

The cultural sector has become increasingly active over the past few years in exploring the potential of the telecommunications medium. Most of the projects described in Section 6.1 deal with applications of telecommunications in the "business" of culture, and the reader is referred back to that part of the paper for a detailed analysis of the problems and opportunities arising from these initiatives. The other half of the culture/ telecommunications coin involves the use of the medium as a creative tool. Rather than postponing the discussion of artistic applications until Section 7 of this paper, it will be profitable to examine a few examples of creative applications in the context of this discussion on media. In the course of fulfilling their role as the "antenna" of society, artists have taken the telecommunications medium in some strange directions. Not all of them may appear, at first glance, to be relevant to the "practical" needs of their audiences. However, almost all of these experiments have explored the "two-way" potential of the telecommunica- tions system, rather than the unidirectional feeding of content from one source to multiple, passive receptors.

---

230. Marshall McLuhan, Understanding Media: The Extensions of Man, New York: McGraw-Hill Book Company, 1964, p. 23-4.

231. Strassman, p. 229.

232. Strassman, p. 223.

Perhaps because of Canada's extensive research and development activity in the area of satellite telecommunications, many Canadian artists got an early start in long distance interactive artistic experimentation. For example, in 1980 and 1981, a very active group of artists on the West Coast, belonging to the Direct Media Association, organized a series of international teleconferences and performances designed to foster creative exchange among artists throughout the world. Some of the events sponsored by the group included:

- Pacific Rim/Slow Scan - a slow scan TV event linking members of the group Peacesat Pacific;[233]

- "Artists Use of Telecommunications in Contemporary Art", a teleconference which took place on February 16, 1980, uniting artists from Vancouver, Victoria, San Francisco, Toronto, New York, Boston, Vienna and Tsukuba (Japan);

- A satellite-exchange festival with Japan organized in conjunction with the Emily Carr College of Art and Video Inn in 1980. This exchange included:

  ° a teleconference on contemporary art
  ° presentations of videos and theatrical performances followed by discussions
  ° a real-time dance improvisation involving performers in Tokyo and Vancouver
  ° a dialogue between Canadian Inuit and Japanese Ainu.

- Two performance pieces organized with the Music Gallery in Toronto:

  ° January 26, 1980 - creation of a musical piece by five musicians located in Toronto, Vancouver, San Francisco, New York and Amsterdam and linked via the telecommunications system

  ° February 2, 1980 - creation of an improvised dance using the music composed the week before.

Artists and organizations in other parts of Canada have also participated in this continuing exploration of the medium. Some of the more noteworthy telecommunications-based artistic events over the past few years include:

---

233. Slow scan TV is a technology which converts video camera signals to acoustic signals, transmits them by telephone, then converts them back to video signals at the point of reception for presentation on an ordinary monitor.

It is called "slow scan" because each image takes about 8.5 seconds to form.

- "CANJAM"' an improvised sound performance organized by Ottawa's S.A.W. Gallery on July 1, 1981 which linked performers across Canada via the telecommunications system;

- "Whorled in the Balance" and "Talking Tongues", another performance event sponsored by the S.A.W. Gallery on February 25, 1982, and involving simultaneous performances in Ottawa and Paris;

- "Lasart" a month-long exchange of work between artists in Alma, Quebec and Moncton, New Brunswick which took place in October/ November 1982 using a photolaser transmitter/receiver;

- "La Plissure du Texte", a project organized by la Musée d'Art Moderne of Paris from December 1983 to February 1984 in which artists from eleven cities participated in the collective composition of an "electronic fairytale". Artists from Alma, Toronto and Vancouver took the roles of characters in this fairytale and the text was created, edited and transmitted entirely on-line, illustrating how the telecommunications medium is able to transform the traditional concept of authorship;

- "Particifax", a project involving the exchange of art works between artists throughout the world via telefax (telefacsimile). The works were transmitted throughout the month of June 1984 and "hard copy" versions were displayed on the walls of galleries in Toronto, Grimsby and London (Ontario);

- "Telephone/Music Slowscan", an exchange of music, performance and images between Vancouver and Vienna. Artists from the Western Front Gallery in Vancouver were involved throughout the period between November 15 and December 15, 1983 and, as with Particifax, a permanent record of the event was kept (on video) for presentation at Vancouver's Video Inn in December 1984.

- "Swift Current" an on-line Canadian literary magazine which began operating on July 1, 1984. Organized by a professor of English at York University, "Swift Current" allows Canadian writers such as Eli Mandel, George Bowering, Margaret Atwood and Dennis Lee to store their work on an electronic database and transmit it via the telecommunications system to be read, criticized or revised by other network participants. Subscriptions to the on-line magazine can also be purchased by institutions and individuals with modem-equipped microcomputers.[234]

---

234. The preceding list of projects has been culled from a variety of sources, including books, newspaper articles and departmental files, as well as personal notes. More complete descriptions of some of these projects can be found in "Art et Technologie: Etude préliminaire", a research compendium produced for the Social Policy Directorate in May 1985 by Thérèse Savoie.

One of the most ambitious attempts to utilize the telecommunications system as a creative tool was the "Marco Polo" project organized by the Centre international de recherche, de création et d'animation (CIRCA) of Villeneuve-lez-Avignon in France. In July 1985, eight writers, including two from Canada (located in Montreal and Moncton), two from France, one from Italy, one from the Ivory Coast, one from the Congo and one from Tunisia, collaborated to produce a serial novel entitled Marco Polo ou Le nouveau livre des merveilles. Each writer proposed a character and on July 15 wrote four pages of narrative about that character which was then exchanged via satellite with the other authors. Each successive day between July 15 and July 27, all eight authors chose one of the narratives produced the previous day and continued the story, resulting in a collective work with eight separate but interconnected strands. Basic plot lines were suggested daily by the Italian authors Italo Calvino and Umberto Eco, but each writer was left free to choose the particular character he or she wished to write about on each successive installment. The project received widespread attention in the other media, and as part of the experiment, Le Devoir in Canada and Libération in Paris published a daily "chapter" written by one or other of the authors. Electronic images illustrating events from the story were produced by artists in each of the participating countries. As well, a group of French computer artists created a daily two-minute animated video which was broadcast on the French television network Antenne 2 following the evening newscast. Finally, about a month after the completion of the project, publishers in Paris and Montreal produced a book containing the complete text of the Marco Polo saga.

It is difficult to assess the impact of this particular experiment, which contained elements of both crusade on behalf of francophone literature and media event. Reviewers adopted a somewhat bemused stance toward the final, printed product. One suggested that "On peut ... lire Marco Polo comme un jeu littéraire ou comme une oeuvre littéraire."[235] Another saw it more in the light of a technological plot:

> "... qui sont ces intellectuels qui veulent augmenter la productivité de l'artiste? Seront-ils plus heureux quand une symphonie, grâce aux compressions numériques, sera jouée en huit minutes?[236]

The reaction from the public (the readers of Le Devoir) was mixed. One compared the Marco Polo narrative to "la nouvelle musique". Another was less amused, comparing it to "un délire verbal où on ne sent aucune complicité entre les participants".[237]

---

235. Jean-François Chassay, "8 personnages en quête d'un texte", Spirale, X, 1985, p. 85.

236. Jacques Godbout, "Marco Polo perdu dans l'espace (Quand les écrivains font l'amour à huit ... et par téléphone)", L'Actualité, novembre 1985.

237. Paul Cauchon, "Technologie et littérature : les dessous de l'aventure Marco Polo", Le Devoir, 27 juillet 1985, p. 2.

The creators themselves were much more thoughtful about the experience. Louis Caron of Montreal, one of the Canadian writers involved in the project, commented on the effect of the technology on his personal writing style:

> Mon modem est comme une bouteille à la mer qui recevrait instantanément une réponse. L'ordinateur change le style: il te force aux phrases plus courtes, à l'exigence. Sur l'écran, le texte est neutre, froid, écrit, ce n'est plus la matière chaude en gestation sur le papier. Tu t'en dégages, tu prend plus vite une distance.
>
> A bien y penser, toute cette grosse technologie nous ramène aux fondements mêmes de l'écriture, à l'oralité: c'est l'art du raconteur, de celui qui reprend la parole suite de l'autre.[238]

Hervé Fischer, a multi-media artist and one of the Canadian organizers of the project, takes this a step further, suggesting that the effects of electronic technologies will go far beyond the mere alteration of personal style:

> ... on assiste à une démystification de la création littéraire. Les oeuvres deviennent plus collectives parce que plus médiatisées. Ce ne sont plus des objets mais des messages. Sur l'écran cathodique, l'oeuvre d'art n'a plus le statut d'objet sacré, fétiche. Cette situation va graduellement modifier le statut de l'artiste.[239]

It is obvious that artists see in this type of telecommunications exchange the beginnings of a new kind of art, perhaps as revolutionary in its own way as the invention of the printing press or the birth of naturalistic oil painting. An artist not involved in the Marco Polo project, defines the issue this way:

> One characteristic of telecommunications is the two-way or interactive format. Video games offer the prototype for a certain machine/person interaction, while another comes out of sophisticated teleconferencing techniques, the territory of videophones and video-panel-equipped boardrooms. Somewhere in between is a potential model for collaborative electronic authorship, independent of time and space contingencies. Think of a group of artists collectively building a work whose final structure is then decided by the "viewer", the user accessing it. The attraction of these aspects of interactiveness is the horizontal rather

---

238. Paul Cauchon, p. 20.

239. Paul Cauchon, p. 20.

> than the hierarchical nature of participation. Telecommunications technology can lessen the gaps of distance, delay and creative isolation.[240]

At this stage, it is premature to speculate on the impact this might have on the rest of society. However, it is often events occurring seemingly on the periphery that contain the seeds of fundamental change. When viewed from this perspective, no card, no matter how wild, should be heedlessly discarded.

A more immediate concern for artists is whether they will get the chance to deal some of these wild cards. As one artist, speaking at a symposium on new technologies put it:

> The question of whether technology will further empower or disempower the artist is tangential: more meaningful is whether artists will form a recognizable constituency within the very complex extensions of telecommunications technology.[241]

Artists appear to have no illusions about the fact that telecommunications technologies are currently controlled and dominated by big business and big government. While most of the artistic experiments described in this section have been supported in part by governments grants (many of them from the Department of Communications), their status has generally been that of "one-time" experiments. In most cases, not even the artists themselves have given much thought to potential impact or follow-up.

The evidence would suggest, however, that artists and the rest of the cultural community constitute a fairly large and innovative "constituency" of telecommunications users. The reader is referred once again to the databases and networks described in Section 6.1 and to the computerized ticketing operations outlined in Section 6.3 for examples of the type of activity currently underway. The experiments described in this section suggest that we may be seeing only the tip of the iceberg insofar as the interactive potential of the telecommunications medium is concerned. Therefore, it would appear logical that the Department of Communications devote considerably more attention to the telecommunications needs of the cultural community and the strategic implications of current and future cultural activity in this area. Recommendation 5 of this paper deals to some extent with the need to establish mechanisms to improve cultural access to research, development and investment funds for innovative projects involving communications and informatics technologies. Considering the central importance of both telecommunications and culture in the department's mandate, developing this focus and supporting it with adequate resources should be among the top priorities in the DOC agenda.

---

240. Nell Tenhaaf, "Defining the Issues" in Artists Talk About Technology, Toronto: ANNPAC (Association of National Non-profit Artists Centres), 1985, p. 11.

241. Nell Tenhaaf, p. 12.

6.5.3 Videotex

6.5.3.1 Overview

Videotex as a medium has proven to be somewhat of an enigma. Millions of words have been written on the subject since the late seventies, but the technology has not as yet developed a high profile in the consumer market. This state of affairs has proven to be frustrating to the developers and promoters of videotex because the technology was originally touted as a potential mass medium for the dissemination of business, consumer and cultural information. The market for these services has not materialized to the extent predicted five or six years ago, and the entire videotex industry (at least in North America) is now in a period of retrenchment as it contemplates and re-assesses its future direction.

Why has videotex not lived up to the bright promises of the early 1980s? There is no simple answer to this question. There are, however, some possible explanations arising from social and cultural experiments with the technology which would suggest that incorrect assumptions have been made about the nature of the medium and, consequently, about the extent to which users would adopt videotex as an information source.

To ensure that the reader has a clear point of reference for the discussion that follows, a few points of explanation are in order. The first is a definition of the term "videotex" as it is being used in this paper. The second is a brief overview of the technology - what it does and how it has been used to date.

Videotex has been defined in general terms as "a computer technology that enhances the way in which textual and graphic information can be displayed and handled".[242] Broadcast videotex or teletext involves the one-way transmission of encoded data from a cental source to multiple television receivers where it can be displayed on either all or part of the screen. While certain cultural agencies such as the CBC have experimented with teletext as a medium for the dissemination of news, weather, sports results and various types of community information, this paper will not deal at any length with teletext.[243] It will instead concentrate on videotex, the two-way version of the technology, which allows the user to send messages back to the host computer where the content is lodged.

---

242. Wescom Communications Studies and Research Limited, The Market for Videotex, Teletext and Related Services, Vancouver: DSS Contract IER: 36100-4-4211, November 1985, p. 8.

243. More information on the CBC's teletext experiment, Project IRIS, can be obtained from the DOC publication Telidon Trials and Services, published in 1983, and the CBC volume The Potential Impact of Broadcast Teletext in Canada, published in November 1984.

Without getting into the technical details of page creation and transmission, videotex works like this:

> ... pages of information are created and edited on a page creation system, either a special unit or a suitably equipped microcomputer. The databases are generally designed to permit the accessing and rapid retrieval of specific items of information on the system. Transmission between the user and the computer can be accomplished on the public telephone network, cable CATV or hardwire LAN (local area network) type system. Generally, a modified TV signal with a decoder translates the data and builds up the video image on the screen. Personal computers equipped with colour monitors and graphics software or decoder are now the most popular display devices. The decoder may be plugged into the antenna or RGB socket of a television. Page transmission is selected by the user through a keypad or a keyboard, and in some cases, touch screens or voice activated systems are possible. The system generally has a two-way capability, allowing the user to send messages to the computer, the database or another terminal on a network.[244]

There are a number of different types of videotex, the most prominent of which are Prestel (developed in the United Kingdom), Antiope (developed in France) and Telidon (developed in Canada by the Department of Communications). Between the years 1978 and 1985, the Government of Canada provided over $60 million to encourage both private and public sector demonstrations of Telidon, international marketing, government procurement and content development. Since 1978, over 30 Telidon trials and services have been implemented in Canada and in other parts of the world. Many of these services are no longer functioning but two of the most visible and successful are Infomart's Teleguide project (which provides information to tourists on accommodation, shopping and recreational attractions via public access terminals placed in hotel lobbies, shopping malls and transportation centres) and Grassroots which provides agricultural information and financial services to farmers via the telephone system).[245]

Telidon received a major boost in 1982 when the Department of Communications was approached by AT&T, the giant American communications firm, which offered to endorse Telidon's videotex coding format if certain aspects of AT&T's own format were incorporated into it. Thus, NAPLPS (the North American Presentation Level Protocol Syntax) was born. In 1983, NAPLPS was endorsed by both the American National Standards Insitute and the Canadian Standards Association. In 1984, the CCITT (le Comité consultatif international téléphonique et télégraphique) of the International Telecommunications Union ratified it.[246] What these actions meant for Telidon was

---

244. Wescom Communications Studies and Research Limited, pp. 9-10.

245. Department of Communications, Telidon Trials and Services, Ottawa: Minister of Supply and Services, 1983, pp. 59-60 and pp. 41-43.

246. Paul Hurly, "Microcomputers and the NAPLPS Specification", Videodisc and Optical Disk, Volume 5, No. 5, (September - October 1985), p. 373.

that NAPLPS became the de facto North American standard for videotex. It was a major triumph for the Canadian version of the technology because it imposed a certain measure of compatibility on the videotex market and effectively curtailed the further expansion of Prestel and Antiope on this side of the Atlantic.

At this juncture, many analysts believed that videotex was poised for explosive growth in the consumer market. Predictions were made that 40,000 Telidon terminals would be installed in Canada by 1983, increasing to 500,000 by 1985.[247] Hardware and software manufacturers jumped into the field in great numbers to produce NAPLPS decoders (required to allow a television set or computer terminal to receive a videotex signal), page creation terminals and software which would turn microcomputers into page creation devices. Canadian companies such as Norpak invested heavily in the production of dedicated page creation hardware and were later joined by Canadian software companies such as Tayson, Cableshare, Limicon, Formic and Microtaur, which developed software for page creation on ordinary micros. Meanwhile, many of these software companies were also actively working on products which allowed the same ordinary microcomputers to serve as hosts for videotex database systems with up to 24 connected terminals.

Unfortunately, despite these heavy investments by both the public and private sectors, videotex failed to penetrate the consumer market as originally anticipated. Only four residential services of any size got off the ground - Knight-Ridder's Viewtron in Florida, Times Mirror Videotex's Gateway service in California, Centel Corporation's Keyfax service in Chicago and Infomart's Grassroots in Manitoba. At their height, Viewtron had about 20,000 subscribers, Gateway about 3,000, Keyfax about 1,000 and Grassroots about 2,000.[248] Of these services, only Grassroots remains: Keyfax collapsed in 1985 and Viewtron and Gateway closed down in March 1986 in what Viewdata/Videotex Report referred to as "A black March for consumer videotex".[249]

What happened to the dream of a mass consumer videotex market in North America? This question may perhaps best be answered by examining some of the cultural and social applications of the technology and then turning to assess the various post-mortems (perhaps premature) that followed their implementation and, in certain cases, demise.

---

247. Jonathan Chevreau, "Revised goals recommended for Telidon," The Globe and Mail, October 14, 1983.

248. Richard W. Stevenson, "Videotex Players Seek a Workable Formula", New York Times, March 25, 1986, p. D.1 and Wescom Communications Studies and Research Limited, p. 35.

249. "A black March for consumer videotex: Gateway and Viewtron close", Viewdata/Videotex Report, Volume 7, No. 3, (March 1986), p. 1.

NAPLPS is an extremely efficient code for storing and transmitting information in electronic form. So attractive is videotex technology from a technical point of view that many of its developers and promotors appear to have focussed almost exclusively on the "hardware" side of the equation. By 1983 or so, it was becoming clear that videotex was caught in what was referred to as a "chicken and egg" dilemma:

> Information providers will not create content until there are proved commercial needs for such information and services. "But home and business consumers will not use the services until there is a wide diversity of useful information and data available".[250]

The situation prompted some very candid reassessments by DOC personnel:

> Gil Dobbin, senior consultant at the Communications Research Center confesses, "The big problem with any of this stuff is getting people to take it out and implement a product with it". The Department of Communications' Brian Casey is more candid: "I think the problem is still there's nothing I want to see on the damn screen unless I'm a farmer".[251]

The result was a more concerted effort by the Department of Communications to encourage content development, and it was at this stage that the cultural community began to gain access to videotex.

6.5.3.2 Cultural Projects

Artists were intrigued and attracted, naturally enough, by the graphics capabilities of Telidon, and many of them plunged eagerly into various experiments designed to explore the aesthetics of the electronic image. Section 7.4 of this paper on "Computer-Generated Imagery" describes some of the artistic works that have resulted from use of this medium.

Several artists from Toronto participated in the Vista field trial, sponsored by Bell Canada and DOC, which ran from May 1981 to September 1983. While Vista was not primarily an artistic database, it did involve over 130 organizations such as the Royal Bank, Eaton's, Simpson's, the Toronto Star and Holiday Inn, which were obliged to hire artists to create the 65,000 pages lodged on the system. Other Toronto artists found an outlet for their work through the TV Ontario Edutex database which included a series of pages entitled "Videotex Visuals" and "Visuel" displaying, for the most part, examples of videotex art. This pool of creative people coalesced in organizations such as Toronto Community Videotex and the Institute of Creative Communications which continued to explore the use of the videotex medium even after many of the commercially-oriented projects had been discontinued.

---

250. Jonathan Chevreau, The Globe and Mail, October 14, 1983.

251. Canada's Videotex Standard", Microcomputing, July 1984, p. 85.

Similarly, pockets of cultural videotex users have emerged in other major Canadian centres. At the Université du Québec à Montréal a number of videotex projects took place between 1982 and 1985, among them Project Agora which provided "apprentissage de la technologie du Videotex" and Project Image -2 which had a number of objectives including the organization of "sessions d'initiation" and "stages de production" for artists on the use of new technologies (such as videotex) for image creation.[252] A group of artists on the West Coast working out of the Western Front Gallery and the University of Victoria have also been active in electronic image creation, although the concentration upon videotex has been less intense than in Toronto and Montreal.

Many of the most active Canadian videotex artists participated at "The Artist as a Young Machine", an exhibition sponsored by the Ontario Science Centre in the summer of 1984. Canadian Telidon art has also been displayed internationally at such forums as the Sao Paolo Biennale in Brazil in late 1983 and, more recently, at the international colloquium on "Art and Planetary Communication" held at the University of Salerno in Italy in May 1986.

The museum community has also been an active experimenter with videotex. The National Museum of Man has developed Telidon pages for both its public access databases and for its volunteer training program. The National Museum of Science and Technology has similarly developed in collaboration with TV Ontario a series of pages on science and technology which are used for public educational purposes.[253] In Vancouver, the Arts, Sciences and Technology Centre undertook an ambitious project in 1984 to produce 2,500 Telidon pages related to the British Columbia schools' science curriculum. These pages were lodged on the Centre's own mini-computer and made available to eight Vancouver grade schools on a pilot project basis. In addition, some 1,500 additional Telidon information pages were to be produced to complement the Centre's exhibits and programs.[254]

In the Waterloo-Wellington area, a ten-museum computer network (see sub-section 6.1.E.2 of this paper for a complete description of this network) began work in 1985 to interface Telidon graphic information with collections management text files. The object was to automate not only the textual information on a museum artifact record, but also the visual

---

252. Appendice à la demande de reconnaissance officielle du Laboratoire de Télématique, UQAM, Montréal: Université du Québec à Montréal, septembre 1984, p. 14 and p. 21.

253. Wescom Communications Studies and Research Limited, pp. 231-233 and Department of Communications, Telidon Directory, Ottawa: Department of Communications, April 1984, no page number.

254. Cultural Initiatives Program files, DOC.

information, including any photographs, slides or drawings in the manual files. A demonstration module was actually prepared, installed in the lobby of one of the museums and used during interpretive talks for museum visitors. However, the project was not taken beyond the demonstration stage because the participating museums concluded that optical storage technologies offered a more attractive means of capturing visual information than videotex.[255]

These applications, for the most part, demonstrate that the primary cultural uses for videotex have been:

- as a creative tool for the exploration of electronic imagery;
- as a public access tool to convey information or to educate a particular audience.

Only one cultural group, the CIRPA/ADISQ Foundation has experimented to any great extent with the use of Telidon for business purposes by attempting to integrate graphics with the textual information in its Canadian On-Line Record Database. As indicated in Section 6.1.E.1, this project was abandoned due to lack of commercial demand.

6.5.3.3 Discussion

An assessment of these Telidon projects reveals a somewhat mixed reaction by the primary users. No rigorous evaluation of the success (or failure) of cultural applications of Telidon technology has been done, so the discussion below must draw on informal feedback from artists, as well as assessments of various non-cultural videotex experiments documented in the literature. Fortunately, the principles governing the use of cultural videotex databases do not appear to differ significantly from non-cultural ones, and it is therefore possible to draw some common conclusions.

The chief appeal of videotex as an artistic medium, beyond its capacity to create a new kind of art, is its interactive potential. The preceding sub-section (6.5.2) has discussed in some detail artistic fascination and experimentation with multi-point exchanges via the telecommunications system. Some of the same type of artistic feeling is also associated with videotex. Artists are by nature, a disruptive lot: they are usually unwilling to accept the limitations imposed on any technology by commercial or scientific authorities. Therefore, their priorities and experiments sometimes clash with those of more established interests. In the case of Telidon, there is some evidence to suggest artistic frustration with the way that the technology was introduced and promoted, although this frustration has not been translated into a negative assessment of Telidon itself.

---

255. E.M. Avedon, Management Applications in a Community Museum Computer Network (A Summary Final Report for the Special Program of Cultural Initiatives, Department of Communications), May 1985, pp. 8-9.

In May 1985, members of the Institute of Creative Communications, a Toronto group which developed out of the Telidon field trials of the early 1980's, met at a gathering that was billed as a "Twilight Brunch" to discuss a number of topics related to the new technologies, including "Videotex Interactivity". Their comments in this informal setting were frank and revealing.

> Andrew Owens:
> Videotex has a lot of intrinsic strengths. It is an interactive medium and there is the potential for two-way communication.
>
> Richard Hill:
> Interactive means a dialogue. What is the point in pretending that Telidon was developed as an interactive medium when it wasn't used as such. You simply pushed buttons to receive information.
>
> Andrew Owens:
> It has been used "reactively" rather then (sic) interactively. Teleguide has used Telidon as a one-way medium. Teleguide is basically advertising. There is absolutely no editorial content. I would term it an electronic flier.
>
> The government considered that people would eat this up? I don't see people lining up for this service.
>
> * * *
>
> Allan Orr:
> Unfortunately, that application has not done much to test the limits of videotex, or to explore the unique applications of the medium. I think people still prefer looking at the Yellow Pages to find a Chinese restaurant. Possibilities for more meaningful dialogue between the user and the system must be worked at. The dynamics between text and graphics in creating valuable "hard" information should be explored.[256]

Many artists felt cut off from the mainstream of Telidon development and, in retrospect at least, express some bitterness at being excluded. Their perception of the Department of Communications' priorities for Telidon is not unique: other individuals have commented on the very heavy "technology push" of Telidon's early years. But their suggestions for a remedy are interesting.

> Andrew Owens:
> But it (Telidon) was being positioned by the government and Infomart as necessarily a very expensive technology to work with. "If you are not a megacorporation, then videotex is out of your league".

---

256. The Twilight Brunch Transcript, Toronto: Institute of Creative Communications, 1985, p. 1.

> Intrinsically, videotex won't be expensive. We now have software decoders that could be readily copied and distributed at little cost. These could have been developed five years ago.
>
> The initial videotex equipment was sold by Norpak at $28,000 a machine. Hundreds of machines were sold to Bell Telephone with a 50% tax payer subsidy. This sort of hardware production activity created an aura of expense to the Telidon trials. The impression was cultivated that this technology would only involve large corporations. Major investments were sought by government from private industry. Corporations such as Infomart were told that this activity was going to generate big money.
>
> The idea of mass producing free copies of decoding software for micro-computers and giving them away to the public was never explored. The government's Telidon program did not finish until 1984.(sic) At that time, micro-computers had already gained wide usage and seemed to be the wave of the future. Only projects that required a lot of investment, that were "revenue generating" and had the prospect of creating jobs were entertained. The various priorities of the government at that time effectively corrupted people's view of videotex as a communications technology.[257]

These comments are remarkable for their similarity to an assessment of the market for videotex recently carried out for the Department of Communications by Wescom Communications Studies and Research. That study summarized the problem as follows:

> There has, however, been a much slower market development for all videotex and teletext services than originally forecast. A variety of explanations have been offered to account for this situation which vary from observer to observer. Some fundamental problems have nevertheless been identified and include:
>
> - poor quality data bases e.g. too general, information available more easily through other sources;
>
> - high costs for all parties, the consumer, the system operator, and information/service providers;
>
> - unifunctional terminals - videotex terminals are expensive and have little utility other than information retrieval;
>
> - lack of knowledge regarding content development.[258]

---

257. The Twilight Brunch Transcript, p. 2.

258. Wescom Communications Studies and Research Limited, (reference footnote # 242), p. 34.

What is even more remarkable about the artistic assessment of Telidon is that, despite the setbacks and frustrations, artists remain optimistic about the future of the medium. In the words of Carol Casselman, a member of the Institute of Creative Communications and an artist who got her start in videotex working for Eaton's during the Vista videotex field trials:

> We shouldn't talk about losing four years. The time will seem insignificant in the long run. We are frustrated by setbacks having lived with the struggle from day to day for years. It is hard to maintain a good perspective.
>
> In 1981, ICC started forming. There were 130 individuals and organisations involved in the Bell Telephone Vista trial from 1981 to 1984. We are not going to see the benefit of this investment for a few more years. It was groundwork. It is research and has to be done. It has to be done in any industry. Our complaint against the government was their lack of concern over what people could look at on Telidon databases. We thought that if you didn't have anything to show people then, what is this technology all about? Let's create some content.
>
> A lot was learned through the nearly three year Vista trial. A lot of very basic developments happened at that time. Without that initial work, NAPLPS wouldn't be what it is today. This growth in human potential takes time.
>
> I always think it was like when the telephone or TV was discovered. They obviously had the same problems that we have been experiencing with videotex in terms of lack of growth at the beginning. The growth of a technology is a process that takes time to evolve. All the work we have done is very important. The fact that it didn't make big bucks fast, is really unimportant.[259]

Is this optimism justified? Unfortunately, no one involved with the videotex industry has as yet perfected the crystal ball, and it is not possible to make categorical predictions at this stage. However, there are lessons to be drawn from past experience and from the comments above.

At a recent forum on electronic publishing held in Washington, D.C., Paul I. Bortz, managing director of Browne, Bortz and Coddington and a former deputy assistant secretary of commerce with the U.S. federal government, suggested that the software and electronic publishing business could be analyzed using the "television model" which divides the industry into four segments:

- program production and creation - can be expensive, involving huge and risky investment;

---

259. The Twilight Brunch Transcript, p. 5.

- wholesale distribution - can be a television network, a nationwide data communications network or a satellite;

- retail distribution - can be a broadcast station, a local area distributor or a local cable system;

- comsumption side - can be a business, a household or some other organization.[260]

Using this model in relation to videotex, it is possible to conclude that:

> What we have seen in the past 10 years has been an explosion in the capacity for retail and wholesale distribution. What has been almost totally neglected is the economics of production on the one hand and the behavioral and dollar aspects of consumption on the other.[261]

Both these latter areas are worth examining in closer detail, not only for their relevance to the discussion on cultural uses of videotex, but also for what they have to say about the introduction of videotex in the wider marketplace.

Consumption or Demand

Why would anyone wish to consult a videotex database? Certainly not just because it is there. Surprising as it may seem, however, very little attention has been paid to date to the dynamics of information consumption or why one medium is chosen over another to deliver a particular type of content.

One factor is certainly cost. When Times-Mirror and Knight-Ridder closed down their consumer-oriented videotex databases in March 1986, the editor of International Videotex - Teletext News remarked, "You're asking for a great leap of faith when you ask people to buy information on line for $30 to $40 that they can get from a newspaper for 25 cents."[262] On the hardware side, it has been suggested that consumer videotex will not be viable until the terminal adds no more than $10 to $25 to the cost of a television set.[263] Also not to be ignored is the large installed base of personal computers which operate under the ASCII (American Standard Code for Information Interchange) code and which require special NAPLPS decoders

---

260. Taken from an article by Paul I. Bortz, "Being Realistic About Videotex", in Electronic Publishing Plus: Media for a Technological Future (ed. Martin Greenberger), White Plains N.Y.: Knowledge Industry Publications, Inc., 1985, pp. 115-116.

261. Paul I. Bortz, p. 116.

262. Gary Arlen, quoted in "2-way TV may have only one way to go," The Globe and Mail, March 19, 1986, p. B19.

263. Paul I. Bortz, p. 115.

to receive Telidon. ASCII - based videotex, which offers a lower grade of graphics and text than NAPLPS, has already captured a large part of the market for information retrieval, transactions, banking and shopping. (Typical providers are the Source, Compuserve and Dow Jones services.)[264] It appears unlikely that consumers will invest in additional expensive equipment unless there are compelling reasons to do so.

Another factor which must be taken into account is intensity of consumer interest. There is now some evidence to suggest that demand for information from new electronic media is qualitatively different from the demand for standard mass media such as print or television. In a time-use survey conducted by the Department of Communications and the Canada Employment and Immigration Commission in 1981, the following was discovered:

- 20 per cent of all secondary television viewing took place as a background to meals;

- 35 per cent of secondary TV viewing episodes (excluding watching movies) took place during the performance of household chores;

- 25 per cent of all secondary radio listening took place while travelling;

- 19 percent of all secondary reading of books, magazines and newspapers took place while watching television;

- 26 per cent of primary reading activity took place while the television was on;

- 28 per cent of primary reading took place while the radio or a sound recording was being listened to.[265]

On the other hand, the nature of demand using electronic media does not allow the activity to be anything but primary. Videotex, for example, demands that the user make a deliberate choice to call up each page. Therefore, the user must be committed to obtaining the information: he/she must want to use the videotex content badly enough to concentrate on nothing else.

While this is psychologically interesting, it also has economic implications. As one group of researchers observed:

> There is no economic way to differentiate between the responses of somebody who reads every word of The New York Times and somebody who just looks at the headlines. They both pay the same

---

264. Wescom Communications Studies and Research Limited, p. 203.

265. Brian Kinsley and Frank Graves, The Time of Our Lives: Explorations in Time Use, Volume 2, Ottawa: DOC/CEIC, no publishing date, pp. 50-51.

> amount of money. With the mass media, intensity of interest has no economic corollary, whereas with electronic media you can establish charges commensurate with use.[266]

Artists are correct when they focus on the interactive aspects of videotex as the key to the medium. Its nature is such that the content must be important enough to the user to deliberately seek out and deliberately pay for.

The principal challenge for videotex proponents in the next few years will be to find those niches which meet the criteria cited above. A couple of studies conducted over the last decade on the information - seeking behaviour of the average consumer may help shed some light on the household market:

> How often does the average consumer consult a reference book? The most frequently used reference source is the telephone book; 21% of the population consults it on an average day. The second most frequent source is material on food preparation, at 18%, followed by catalogs of various sorts at 9%. Over the last six months, only 5% of the population has consulted an encyclopedia, only 3% a book of facts and only 2% a book of quotations. The average person on an average day spends a total of 35 seconds consulting information resources.[267]

The market limitations implied by these figures are not necessarily engraved in stone: successful technology has a way of creating a demand once its possibilities are known. However, a cautious approach to the so-called "mass" consumer market is called for, especially among those whose job it is to develop and promote consumer videotex. One consultant recently posed the question, "Why do we tend to overestimate the growth rate of information services?" The response carries echoes of the "technological sublime" discussed in Section 6.5.2 above:

> Perhaps we as the information elite are inherently unsuited to evalute (sic) the growth of information services. The very abilities we have that help us address issues of defense, economics, social policy, and law may distort our vision when we are dealing with a business that excites us more than the population-at-large. We may lack the skepticism others have, and this may prevent us from developing a balanced view.[268]

A good deal of attention has been focussed of late upon the success of the French telephone-based videotex service, Teletel, which is also commonly referred to as Minitel after the dedicated terminal used by the service.

---

266. W. Russell Neuman, "The Media Habit" in Electronic Publishing Plus: Media for a Technological Future (ed. Martin Greenberger), White Plains, N.Y.: Knowledge Industry Publications, Inc., 1985, p. 11.

267. Cited in W. Russell Neuman, p. 8.

268. Paul I. Bortz, p. 119.

The French Direction générale des télécommunications (DGT) solved the "chicken and egg" dilemma by giving away the Minitels to telephone subscribers, who had a choice between a videotex telephone directory or a traditional hard copy one. (The reader will note that this approach is similar to the artistic community's suggestion, cited above, that the federal government should have given away Telidon software decoders to stimulate demand for videotex.) Approximately 1.2 million households had opted for the Minitel by May 1986, [269] and French telecommunications authorities are said to prefer the voluntary approach because the clients are then "plus motivés".[270] While the telephone directory service is part of the Teletel subscription and is free for the first three minutes of each call,[271] non-subscription services are also offered by over 1100 private information providers. In November-December 1985, revenues from these non-subscription services totalled over 80 million francs (or about $10.7 million U.S.). Level of usage for each Minitel terminal doubled from 43 minutes per month in January 1985 to 88 minutes per month in December 1985, and total connect time was estimated to be 11.7 million hours in 1985.[272]

These are undoubtedly impressive figures which suggest that consumer demand may not be as flat as American experts believe. Nevertheless, several important points should be noted:

1. 77 per cent of all Minitel users consult only the electronic telephone directory service.[273] This tends to confirm the finding cited earlier that the telephone directory is the most frequently used reference source by the average consumer.

2. Usage figures for other services are as follows:

   - banking, tourism and transport services and games - 19 per cent;
   - recreational/cultural services and directories - less than 10 per cent;
   - electronic mail - 5 per cent.[274]

---

269. "Minitel Mania" spurs eight-fold growth in French videotex revenue", International Videotex/Teletex News, May 1986, p. 7.

270. Eric Le Boucher, "Le phénomène minitel", Le Monde, 12 avril 1986, p. 27.

271. "Prestel comes off second best to Teletel in British press", Videoprint, Vol. 7, No. 7, April 8, 1986, p. 2.

272. ""Minitel Mania" spurs eight-fold growth in French videotex revenue", p. 7.

273. "La consultation du minitel ne cesse de croître", Le Monde, 21 avril 1986.

274. "La consultation du minitel ne cesse de croîte", Le Monde, 21 avril 1986.

3. Three out of four users indicate satisfaction with the services. Two out of three said they would continue to utilize them.[275]

4. Unconfirmed reports indicate that as many as 30 per cent of Minitel customers may be returning the terminals due to dissatisfaction with services.[276]

5. A survey carried out for DGT in March 1986 indicated that the chief complaints about the service were inadequate page summaries, slow access time, mediocre graphics and high cost for non-subscription services.[277]

The strength of the French system, as opposed to the North American experiments in consumer videotex, is that it is subscriber-based rather than advertiser-based. The "user-pay" approach means that only those services for which there is a demand are supported. The weakness may be that the entire service infrastructure rests rather heavily on the one proven consumer information resource - the telephone directory. It will be interesting to see whether Minitel users will remain sufficiently "motivés" to continue to utilize the non-subscriber services on the system at the same rate as in 1985.

The general discussion above of consumer videotex services is relevant in the cultural context because the same types of questions and the same type of analysis are required to determine feasible applications of videotex in the cultural sector. At the moment, in North America, the only clearly lucrative prospects for videotex usage appear to lie in the business sector in the form of corporate videotex databases. Such database systems are generally used to provide corporate employees with an inexpensive medium for the rapid dissemination of company manuals, indexes, newsletters and schedules. In many cases, these are stripped-down NAPLPS systems because "the overwhelming majority of corporate videotex applications do not require graphics."[278] The "bottom line" of business applications is, in fact, the bottom line. Therefore, the videotex system, like any other management information system, must respond in a cost-effective manner to management's needs. The hard truth is that commercial users have far more financial and human resources to exploit the potential of videotex. Therefore, they can often afford to design systems where all the key concepts - interactivity, relevance, ease of use - come into play. At the United Telephone Company of Florida, for example, an award-winning system works this way:

---

275. Eric Le Boucher, p. 32.

276. ""Minitel Mania" spurs eight-fold growth in French videotex services," p. 7.

277. Eric Le Boucher, p. 32.

278. Bob Wallace, "Videotex moves out of the home," Computerworld on Communications, August 1, 1984, p. 16.

> Information from large mainframe databases no longer has to be retrieved from written reports. A software utility summarizes mainframe data and converts it to a format that can be loaded directly into the Infonet Videotex system, which is fast becoming the primary means of information distribution within the company. The user can then further analyze and manipulate the information at his own terminal.
>
> * * *
>
> Each department selects one or more information providers for Videotex. These people are responsible for loading and updating information. Special control programs allow these "providers" to directly update or make changes in their "infobase", so there's no need for a Videotex manager or supervisor. Executives ... also send out their monthly reports on Videotex, eliminating the need to print, copy and manually distribute them.[279]

Cultural videotex applications will also probably have to adopt this practical, decentralized approach. Artists and cultural users are certainly "motivated" in the Minitel sense of the word and are enthusiastic proponents of the interactive approach. But they are not overly-endowed with cash, nor have they been able to demonstrate a proven demand for their videotex products. The second neglected segment of the "television model" provides an opportunity to explore these factors.

Production

It would appear that some strategy such as the French Minitel initiative would be the best "window" through which the cultural community might enter into the videotex market. The figures from the French survey of Minitel users indicate that about 10 per cent use the system to consult information sources on cultural and recreational activities and directories. This would represent a fairly healthy potential market for culturally-oriented videotex, if this demand is translatable to the Canadian context.

The chief advantage of the Minitel approach is that it is content and subscriber-driven rather than hardware-driven. With a substantial base of videotex terminals installed in Canadian homes and businesses, information providers would have to build the cost of capital expenditures into their subscriber rates. Nor would the subscriber, as in the case of the failed North American services, have to make substantial outlays for the purchase of terminals or for monthly fees in the range of $30 to $40. The user-pay approach of the French Minitel service "democratizes" the system by giving the consumer a choice as to the information he or she wishes to consume. It also opens the door to a host of potential information providers, including the cultural community, that have been hitherto excluded by the "big money" approach to videotex.

---

279. "A Top-Down Approach," Administrative Management, March 1986, p. 29.

Is the cultural community prepared to take the risks implied by this type of videotex strategy? No studies have been done on this question, but here is what one artist belonging to the Institute of Creative Communications had to say:

> Suzanne Nash:
> If there are five arts organizations doing computer generated graphics, they should get together and set up five data bases on a couple of Winchesters on one installation. Offer 24 hour access and sell subscriptions at $9.95. The subscriber gets maybe gets (sic) any three out of the five.
>
> Services could be replaced if they didn't get enough viewers. They would have to come up to snuff or get bumped.
>
> Money would filter from the subscriber, viewer, back and forth. You would compete against each other.[280]

The model being described above is cable-TV-based, but it illustrates that a least a few artists would be prepared to take their chances in the marketplace if they could get access to a distribution system. The government, particularly the Department of Communications and the federal cultural agencies, should have a vested interest in encouraging this entrepreneurial spirit since artists and other creators who are selling their work will have less need of support from the public purse to earn their livelihood.

It will be important to approach this "new" videotex market, if it materializes, with no illusions. Despite the reams of paper produced over the past few years, relatively little is known about the nature or the size of videotex demand among "average" consumers. It does appear, however, that it is wrong to view videotex as a "mass" market in the traditional sense. There may ultimately be a fairly substantial user base but it will be made up of numerous "niches" for which content is specifically tailored. According to Paul I. Bortz:

> We must recognize that the new media are competing against newspaper, television, radio, books, and magazines. We should start to view markets as smaller and more targeted than we tend to do. If your business plans are aimed at providing a service to 30% to 50% of the population, you are headed down the wrong road.[281]

For this reason, it will probably still be necessary to invest fairly heavily in marketing services as part of the production cycle, even in a Minitel-style universe. The president of Marketfax, a Toronto-based videotex service that offers raw data from the major North American stock exchanges, is blunt:

---

280. The Twilight Brunch Transcript, p. 25.

281. Paul J. Bortz, p. 116.

> I don't go out and sell any NAPLPS applications. I'm selling Marketfax. I'm selling information, and the client doesn't care whether its NAPLPS or whatever format.[282]

Or, as Doug Peter, president of St. Clair Videotex Design Inc. in Toronto, has observed:

> ... videotex is "a marketing challenge, a classic one," and is not a technology-push industry.
>
> "We are an intelligent part of the communications industry. We must apply that intelligence to our marketing efforts as a dynamic industry with a growth potential that is virtually without limit."[283]

The need for enhanced marketing has also been recognized by a study done for DOC in 1985 on market prospects for videotex:

> Another frequently mentioned factor is inadequacies in marketing expertise and strategic planning as barriers to the viability of our software industry. Our own interviews with software developers, as well as our review of the relevant industrial literature, confirms the importance of marketing expertise in the videotex applications software market for transactional services. Therefore the DOC could provide enhanced market information in this area.[284]

In the cultural sector, the possibility lies open that a decentralized, low entry cost videotex market on the French model might attract information providers from the museum community, the publishing community and the independent artists community, possibly grouped into non-profit collectives or commercial companies. If and when the technology proves itself as an efficient and attractive information source, other cultural industries such as film and sound recording might also enter the field. With such a diverse array of content providers, it is obvious that a number of funding and consultative mechanisms would be required to launch them as service providers. It seems unlikely that any of these possible cultural participants would have the resources to spare for even the modest investments needed to become a Minitel-style provider. Therefore, the federal government should probably be prepared to furnish seed money and advice at the outset of any large-scale consumer videotex experiment in order to ensure that the cultural community has the opportunity to take advantage of the system. Mechanisms that might be used (depending upon whether the potential information provider was a profit-oriented or non-profit group) include:

---

282. "Canada's Videotex Standard," p. 83.

283. "Videotex Future Lies in Marketing, Not Technology Asserts Industry Official", Videodisc and Optical Disk, Volume 5, Number 5, (September-October 1985), p. 352.

284. Wescom Communications Studies and Research Limited, p. 286.

1- the Canada Council
2- DOC's Cultural Initiatives Program
3- the proposed Canadian Cultural Investment Bank (see recommendation 5 of this paper)
4- the proposed Marketing Bureau for Cultural Products.

Other mechanisms may also be available, if and when it is decided to proceed with a Minitel-type experiment.

There is no doubt that artists and the cultural community would be among the most enthusiastic supporters of the government if such an initiative were taken. It is perhaps appropriate to end this sub-section with an observation by a member of that community, Richard Hill, the chairman of the Department of Photo-Electric Arts at the Ontario College of Art:

> I think that the potential doesn't lie in the one-directional, provider-to-consumer "market". I think the government's Telidon usage demonstrated this.
>
> What the system should be achieving is reciprocal resonances; someone who is going to respond to what you have. That response is the basis for what develops. A thing is alive if there is possible reciprocal flow, it is dead when there is no reciprocal flow.[285]

6.5.4 Optical Storage Technologies

Everybody, to a certain extent, has already come in contact with one member or other of the optical storage technology "family", whether in the form of a videodisc version of an arcade game or a compact audio disc played on the home stereo. However, this technology is available in a bewildering variety of formats and sizes, and it will therefore be necessary to identify with precision the subjects to be discussed in this sub-section.

The media being considered in this paper are videodiscs and optical data disks. Since the terminology associated with the field of optical storage technologies is also in a state of flux, the following definitions may help the reader to keep the object of the discussion in focus.

Videodiscs are plastic optical disks encoded in an analogue format. This encoding system normally employs a laser to mark the surface of the disk with either microscopic pits or bumps representing a continuously variable analogue FM signal. A less powerful laser is used to read it. Analogue encoded disks are usually utilized to record audiovisual materials, such as films, videotapes, photographs or other types of images, for playback on TV or TV-compatible monitors. While videodiscs can record digital (i.e. computer-based) data, conversion techniques must be employed. Therefore, the optical data disk is the preferred format for this type of encoding.

---

285. The Twilight Brunch Transcript, p 27.

Optical data disks are also sometimes referred to as digital data disks, CD-ROMs, compact digital audio disks or compact disks depending on the size of the disk employed and the application for which it is used. The common feature of these various formats is the fact that they are digitally encoded, a process whereby the surface of the disk is divided into regularly spaced binary bits and either marked by a laser or not marked. The laser reading the disk sees a mark as a binary 1 or the absence of a mark as a binary 0, which has obvious advantages for the recording of computer data. Although the optical data disk can be used for digital images as well, huge quantities of space are required to store imagery, making the videodisc a generally more economical format for this type of storage task.[286]

Because the cultural applications appropriate to videodiscs and optical data disks are dissimilar and imply different approaches to their use, the first two parts of this sub-section will treat the two media separately. A third part of the sub-section will then use the conceptual framework developed in sub-sections 6.5.2 and 6.5.3 to suggest where optical storage technologies might best fit within the spectrum of cultural media.

6.5.4.1 Videodiscs

Overview

The concept of the videodisc dates back to 1923, but the first modern videodisc was not developed and manufactured until 1973 by NV Philips of the Netherlands.[287] Several major manufacturers, including Pioneer, Sony, Philips and Hitachi, currently produce videodisc players. Another major manufacturer, RCA, withdrew from the market in 1984, discontinuing production of the one videodisc player available in North America which utilized non-laser techniques and disks.[288]

Videodiscs come in several sizes - 8 inches, 10 inches and 12 inches - with the 12-inch size the most popular for consumer and industrial applications. About 54,000 video images with accompanying stereo sound can be stored on the average videodisc side, making it a very efficient means of archiving banks of images. Initially, attempts were made to position the videodisc as a movie playback medium. Unfortunately for the manufacturers of both videodisc players and pre-mastered discs, the videocassette recorder came on the market at about the same time (the mid-seventies) and effectively captured the consumer dollar because of its ability (unlike the videodisc player) to record video signals as well as play them. Therefore, like

---

286. A thorough review of optical storage technologies can be found in the National Library of Canada publication, Optical Disk Technology and the Library (Canadian network papers, Number 9), Ottawa: National Library of Canada, April 1985, pp. 1-7.

287. Michael Gurstein, Alfred Stein and Tom Grandy, A Management Strategy for Optical Data Disk Technology in the Federal Government of Canada, Ottawa: Socioscope Inc., March 1985, p. 10.

288. National Library of Canada (reference footnote #286), pp. 1-3.

videotex, videodiscs have spent the past few years in the "technological wilderness", positioned against competing technologies which have succeeded in occupying the largest and most lucrative market segments.

Despite this fact, videodiscs have some inherent advantages over videotape for certain types of applications. These advantages include:

- much greater play life;
- faster random access;
- for CAV (Constant Angular Velocity - a type of videodisc format) disks; random access to each frame on the disk and a sharp still frame which can be maintained over long periods without wear;
- superior picture quality to even high quality, high speed videocassette;
- superior sound quality to hi-fi videocassette;
- non-erasability - for applications where this is an advantage;
- technical characteristics (for example, random access and still frame) much better suited for interactive computer-assisted applications such as interactive learning programs.[289]

Even the most motivated of users is unlikely to want to sit through 54,000 video frames (or about 30 minutes of playing time) to find the images s/he is seeking. That is why computer technology is employed with videodisc technology to allow random access to specific frames. Even the consumer videodisc player contains on-board microprocessors which allow for stopping at predetermined points and branching to other predefined spots on the disk. More sophisticated systems use microcomputers and sophisticated software to control interaction with the videodisc and provide expanded information retrieval through indexing of disk materials.[290] A typical educational application using a microcomputer controller works like this:

> ... the system might ask the user a question regarding some information it had just presented in a video segment; depending on the correctness of the student's answer, it would review the material or go on to new information. Two students proceeding through the same courseware would most likely receive different output from the computer, because it would tailor its responses to each student's input.[291]

---

289. National Library of Canada, p. 4.

290. John C. Ittleson, "Videodisc and Microcomputers Applications and Software", Intellectual Leverage: The Driving Technologies (Digest of Papers, Spring Compcon '84), San Francisco: IEEE Computer Society Press, 1984, pp. 65-66.

291. John C. Ittleson, p. 63.

As with the other technologies discussed in this sub-section, the concept of interactivity must be considered central to the use of the videodisc medium. Passive playback of feature films did not catch on with consumers because the videocassette recorder offered the possibility of a more active and selective role in the choice of viewing material. Videodiscs offer choice as well, but a different type of choice more suitable to an environment where the user is actively seeking a certain type of information from a large database. As one learning expert observed:

> Interactive delivery systems' focus is on their interactivity, and their strength is their ability to deliver a wide range of materials, whether computer generated graphics, computer text, motion picture film, 35 mm slides, stereo or monaural sound, all in response to input from the learner.
>
> * * *
>
> The "revolutionary" nature of the videodisc and the microcomputer is that they have enabled instructional designers to finally put into practice the research of Skinner and other learning theorists. Experiments that were difficult for the early pioneers in the area of teaching machines, due to the limitations of the technology, are easily done on current interactive delivery systems, and it is that which comes the closest to being a revolutionary concept in the area of videodisc and microcomputer based training and education.[292]

This interactive capacity is now being utilized in a number of applications including:

- industrial or professional training (eg. automobile maintenance disks developed by General Motors and Ford);
- promotional/publicity purposes (eg. U.S. Army recruiting);
- entertainment (eg. arcade games);
- storage and retrieval of audiovisual materials (eg. art images);
- sales and marketing (eg. point-of-sale display to tell customers exactly what they want to know about a product);
- education (courses in mathematics, physics, history, etc.);
- simulations and models (eg. flight simulators, job interviews, safety demonstrations).

Effective as interactive videodisc systems are for information dissemination purposes, they have one major drawback. They are expensive to produce. This is because the design and production phase involves the

---

292. John C. Ittleson, p. 63.

coordination of many individuals with specialized skills. The production team may include:

- the interactive video producer (who is the project manager);
- the instructional or program designer (who is in charge of the teams producing the interactive software);
- the content specialist (the "master teacher" who knows the subject matter and how to convey it to other human beings);
- writers and editors (who produce the scripts, tests and dialogues that appear on screen);
- media producers (the graphic and video artists, computer programmers who put all the pieces in visual form);
- the packager (who integrates the visual, written and computer materials on a master tape and programs the codes going on the delivery system).[293]

A typical videodisc production involves at least four stages:

(1) design and media production - identifying the objectives of a project, choosing a topic, gathering and ordering materials and selecting equipment;

(2) production - writing a storyline, creating a shot list, filming, recording and editing;

(3) post-production - transferring program materials to a master videotape and performing various related tasks such as colour correction, cue and code insertion and editing;

(4) mastering - producing a master disk from the videotape. (This is a highly technical process which is done at a special plant.)[294]

A 1982 videodisc project carried out by the National Library cost approximately $55,000 (excluding the Library's own labour and overhead costs) and took about 6 months to complete. Since this was a demonstration project, only five copies of the videodisc were delivered and, obviously, unit costs would have been much lower if more copies had been produced.[295]

---

293. John C. Ittleson, pp. 67-68.

294. National Library of Canada, p. 19.

295. National Library of Canada, p. 31.

Cultural Applications

Given these costs, very few cultural organizations have been able to make the kind of investment needed to produce a videodisc. This does not mean, however, that cultural organizations have been totally inactive in this area. A few of the cultural projects (both Canadian and international) that have taken place over the past few years include:

- Investigations by the Canadian Broadcasting Corporation concerning the possibility of using videodiscs for archival storage of film, video and audio tapes.[296]

- Development of a databank of 2,200 documents, 600 technical drawings and 10,000 slides by the National Film Board as the first step toward the establishment of a videodisc film library of stock shots.[297]

- Production of a videodisc by the National Library of Canada in 1982 for use as a public relations tool and as a demonstration of the ability of the medium to store and present library materials in a variety of formats (film, slides, photographs, print, posters, handwritten notes).[298]

- Production of a demonstration videodisc by the Public Archives in 1978 (the first Canadian videodisc).[299]

- Production of "Sightlines", a visual art encyclopedia on videodisc by the Curriculum Branch of Alberta Education. This videodisc will contain over 26,000 slide images of world and Canadian art, as well as 10,000 drawings and photographs suitable for use in support of the sciences and humanities curriculum of Alberta schools. Canadian contributors include the National Gallery of Canada, the Art Gallery of Ontario, the Art Gallery of Hamilton, the Musée du Québec, the Edmonton Art Gallery, the Glenbow Foundation, the Alberta Provincial Museum and Archives, the National Film Board, the Alberta Art Foundation and numerous private collectors. The "flip side" of this disk will contain several sequences of computer-generated imagery and the British Broadcasting Corporation (BBC) film "Ways of Seeing". Copies of the videodisc and a printed

---

296. A.D. Cameron and Hugh H. Edmunds, Videodisc Study, Ottawa: DOC files, 1982, p. 351.

297. National Film Board of Canada, Annual Report 1984-1985, Montreal: NFB, 1985, pp. 18-19.

298. A detailed description of this project can be found in the National Library's Optical Disk Technology and the Library (reference footnote #286), pp. 17-35.

299. A.D. Cameron and Hugh H. Edmunds, p. 365.

index are expected to be available by the end of 1986 at a unit cost of about $60, but because of copyright restrictions, will be sold only in Alberta.[300]

- Compilation of archival film and about 2,000 dance photographs by Encore! Encore! (a non-profit cultural organization dedicated to the preservation and promotion of Canadian dance history) and transfer of this material to videodisc. A first pressing of 100 videodiscs is scheduled for July 1986.[301]

- Preservation of approximately 300,000 archival aviation photographs by the Smithsonian Institution's Air and Space Museum (Washington, D.C.) on three videodiscs. The Museum plans eventually to index on videodisc its entire collection of 2 million photographs and to digitize print documents on optical data disk.[302]

- Interface of a pre-recorded videodisc with information on the Cyber mainframe computer used by the Canadian Heritage Information Network (CHIN) to manage collections information from museums across Canada. While the results were technically acceptable, it was concluded that the computer system would have to be substantially restructured to offer videodisc services to CHIN clients on a regular basis.[303]

- Production by the Library of Congress starting in 1984 of a series of videodiscs holding images of:

  - 50,000 photographs, posters, architectural drawings and other pictorial items from the Library's collection;
  - 100,000 motion picture publicity stills from the Motion Picture, Broadcasting and Recorded Sound Division;
  - a selection of seven colour films and film segments;
  - a selection of 30 titles from the paper print collection of pre-1910 motion picture films;
  - two television newscasts from July 3-4, 1976.

  These materials are made available to Library users on a videodisc player and monitor located in the Prints and Photographs Reading Room.[304]

---

300. Conversation with Mary Lyseng, Curriculum Branch, Alberta Education, June 23, 1986.

301. Cultural Initiatives Program files, DOC and conversation with Lawrence Adams, Producer, Encore! Encore!, June 23, 1986.

302. Brad Lemley, "Processing the Past on Disk", PC Magazine, June 25, 1985, pp. 199-212.

303. Fred Granger, "Optical Disk Study", Ottawa: National Museum of Man, (no date), pp. 7-8.

304. National Library of Canada, (reference footnote #286), pp. 8-9.

- Production of the "Primitive Art Information" videodisc by the Metropolitan Museum of Art (New York). Art patrons can browse through a series of rare anthropological films and photographs grouped into twenty-three topics, and focussing on the cultures of the Asmat of New Guinea, the Aztecs, the Northwest Coast American Indians and the tribes of Cameroon.[305]

- Production of a "Videodisc Music Series" by the Univeristy of Delaware. Designed to aid classroom instruction, the four videodiscs in the set contain:
  - full-colour video concert recordings of ten musical masterworks;
  - overlaid musical scores scrolling across the screen in synchronization with the soundtrack;
  - colour-coded format analysis displayed with the score;
  - a collection of supporting slides illustrating important historical and cultural highlights.[306]

- A two-year project (1984-1986) sponsored by the National Endowment for the Humanities and Simmons College in Boston to develop a videodisc database on Emperor Qin Shi Huang Di (a Chinese emperor who ruled about 225 B.C.). With the cooperation of the Chinese Ministry of Culture, the College will be assembling about 4,000 still images, 200 segments of motion video and 4,200 text records relating to artifacts unearthed from the Emperor's tomb in Xian, China. Using the videodisc as a base, the college, in cooperation with MIT's (Massachusetts Institute of Technology) Centre for Advanced Visual Studies, intends to develop seven interactive courses for different levels of users. The advanced programs will allow users such as research archaeologists to pull information into "notebooks" or personal databases.[307]

- Production of the "New Domesday Book" by the British Broadcasting Corporation (BBC) in London. This two-videodisc set will be released on September 29, 1986 to commemorate the 900th anniversary of the completion of the original Domesday Book by William the Conqueror. It will consist of 2 million pages of textual and statistical information, 20,000 ordnance survey maps and 120,000 photographs. The National Disk will contain information on natural resources, transportation, population, demography, arts, crafts, social activities, health, education, and many more topics. Included in this collection will be 40,000 photographs selected

---

305. "Primitive Art Information Videodisc", Videodisc and Optical Disk, Volume 4, Number 3 (May-June 1984), p. 239.

306. "Videodisc Music Series", Videodisc and Optical Disk, Volume 4, Number 4 (July-August 1984), p. 331.

307. "Database development project explores China's past", Computerworld, June 24, 1985, p. SR/22-3.

from museums, galleries and archives which will illustrate aspects of life in the United Kingdom in the 1980s. Copies of the videodiscs will be available in late 1986 for about $100 (Can) per set.[308]

- Production of a videodisc on the Helen L. Allen Textile Collection by the University of Wisconsin-Madison. The disk contains 21,000 full-colour images of individual objects, a three-minute narrated video providing an overview of the history and contents of the collection and a video tour, conducted by the curator, of a recent exhibition. When interfaced with a microcomputer retrieval program called ARTSearch, the videodisc can provide cross-referenced retrieval of both visual and textual information about any object in the collection. The cost of a videodisc and printed index is $250 (U.S.).[309]

- Release of the "KnowledgeDisc" by Pioneer Video Inc. and Grolier Electronic Publishing, Inc. Retailing for $89.95 (U.S.), this 12-inch videodisc contains the text of the entire Academic American Encyclopedia - over 9 million words and 32,000 entries. The KnowledgeDisc can be played on any standard videodisc player, and a user can either browse through the pages of this "electronic book" or, using the index, go to a particular article.[310]

- Installation of an interactive videodisc installation at the Arts, Sciences and Technology Centre in Vancouver using the "Vancouver Videodisc", the first laserdisc archive of any North American city. The "Vancouver Videodisc" program features:

  - access to a global menu and nine main section menus leading to over 130 specific sections;
  - access to over 5,000 historic photographs with information overlays;
  - access to over 20 motion sequences (such as the raising of the roof at B.C. Place Stadium);
  - access to over 3,000 works by 300 artists;
  - access to over 4,000 other photographs (such as stills of 100 plays produced by the Vancouver Playhouse and the Vancouver Arts Club Theatre, and pictures from exhibitions at the University of British Columbia Museum of Anthropology and the Vancouver Planetarium);
  - touch-screen control of any sequence.

---

308. E.M. Avedon, Things to Come?, a paper presented to the 14th Annual Ontario Museum Association Conference, October 27, 1985, pp. 5-8.

309. "Videodisc of the Helen L. Allen Textile Collection", Optical Information Systems, (January-February 1986), p. 11.

310. "Pioneer Video Inc. to be Exclusive Distributor of Grolier's Laser Videodisc Encyclopedia", Optical Information Systems, (January-February 1986), p. 14.

> The system complements exhibits at the Centre and is fully open to the public in a special videodisc theatre. As programming funds become available, the project developers hope to enhance the "Vancouver Videodisc" program and establish similar programs for other videodiscs such as NASA's "Space Disc".[311]

This list is far from complete, but it conveys a sense of the scope of experimentation to date in the broadly cultural uses of videodisc technology. Before discussing the implications and the likely future directions of this cultural medium, this paper will briefly examine a sister technology, the optical data disk, which is also likely to have an impact on the delivery of cultural content.

6.5.4.2 Optical Data Disks (ODD)

Overview

The optical data disk (ODD) is an even more recent technology than the videodisc. North American Philips, under contract to the U.S. Defense Advanced Research Projects Agency, produced the first completed optical data disk in October 1978. This was followed by various initiatives announced in 1979 by Pioneer and SRI-Toshiba and, by Xerox and Thomson-CSF (France) in 1980.[312] Interest in the technology has steadily accelerated since then, and in 1985-1986 commercial activity became absolutely frenetic.

The optical data disk records information in a digital format (as outlined in the introductory paragraphs of this sub-section), a process which makes it particularly suitable as a medium for storing and retrieving machine-readable data (ie. anything that can be scanned and manipulated by computer). The ODD is a close cousin of the compact audio disk (also known as the compact disk) which has taken the consumer music market by storm. World-wide sales of compact disk players exceeded 2 million units in 1985, and more than 65 million disks have been produced.[313] Their market penetration is significant because the same compact disk can also be used to store digital data, and very little additional investment is required to turn compact disk manufacturing plants into optical data disk manufacturing plants.

Hardware developments, as with most of the other technologies examined in this paper, have preceded software developments by several years. The ODD can hold enormous amounts of data, far exceeding the capacity of the

---

311. Patrick Burns, Completion Report: Interactive Videodisc Installation, Vancouver: Arts, Sciences and Technology Centre, (September 19, 1985), pp. 3-10.

312. Michael Gurstein, Alfred Stein, and Tom Grandy, A Management Strategy for Optical Data Disk Technology in the Federal Government, Ottawa: Socioscope Inc., March 1985, pp. 11-12.

313. Peter J. Lowry, "Move over, Gutenberg! CD-ROMS are here", Canadian Datasystems, Volume 18, Number 12, (December 1985), p. 106.

magnetic storage devices on most existing computers. Not all the hardware problems associated with ODD technology have been solved (for example, there is little compatibility among vendors and ODDs come in a confusing array of sizes and formats), but it is now becoming evident to the commercial world that there may be a huge market of content providers and consumers ready to make use of all that potential storage space.

Before exploring the cultural uses for which ODD technology might be appropriate, a few remarks about terminology, formats and capacities are in order.

There are currently three distinct types of ODD:

(1) Read-only disks which, like videodiscs, are pressed from one master disk and distributed on a mass basis. They can be read, as the name implies, by a suitable device (ie. a player or a microcomputer), but they cannot be written upon or changed. The major use of this type of disk to date has been the compact audio disc and the consumer videodisc.

(2) Write-once, read-many (WORM) disks which permit the user to write data once, but do not allow changes once the disk has been encoded. (This is because the physical burning of the disk by the "write" laser permanently alters the surface). The major use for this type of disk has been archival database storage.

(3) Erasable disks which would, like a computer's magnetic disk, have the ability to store and erase data many times. This type of disk is currently in the prototype phase and is not expected to become widely available until the 1990s.[314] Companies now experimenting with erasable disks include Philips, Sony, Toshiba, Matsushita and Verbatim (a sub-division of Kodak).

Optical data disks come in a variety of sizes - 2, 3, 4.7, 5.25, 8, 12 and 14 inches - with storage capacities ranging from about 100 megabytes to 10 gigabytes. For those who have difficulty visualizing a byte, a 540 megabyte disk (a typical size) can hold the equivalent of two hundred 500-page books or about 250,000 pages of double-spaced typewritten copy (about the same amount as 1,500 standard 5¼ inch floppy disks).[315] The 10 gigabyte size (10 billion bytes) could hold 10 million typical museum object records, each consisting of about 1,000 bytes of text or one-half a typewritten page.[316]

---

314. "Verbatim Begins Development of Erasable 3.5 Inch Optical Disk", Videodisc and Optical Disk, Volume 5, Number 6 (November-December 1985), pp. 435-437.

315. Peter J. Lowry, p. 108.

316. David Vance, "Optical Disk Technology", Spectra, Volume 12, Number 4 (Winter 1985-6), p. 1.

Most WORM optical data disks come in the 12 inch size and typically hold 1 to 1.3 gigabytes per side. The most popular read-only format, the CD-ROM (compact disk - read-only memory), uses the same 4.7 inch size as compact audio disk recordings and has a data capacity of 540 to 600 megabytes. The CD-ROM format is rapidly becoming the industry standard for read-only disks because of a number of factors:

(1) it relies on established, tested technology - the same technology that Sony and NV Philips announced in 1980 for audio use;

(2) all CD-ROM disks meet the same physical standard - 4.7 inches in diameter;

(3) the storage capacity equals that of 1,500 floppy disks;

(4) hardware costs are moderate. (CD-ROM drives currently sell for between $1,000 and $1,500 (U.S.), but the price is expected to drop to about $500 by early 1987. Nine companies are now selling drives, with Hitachi, Philips and Sony among the most active.);[317]

(5) cost per disk is in the $10 range.

Whatever size or format is chosen, the ODD offers the user the following advantages:

- low cost archival storage of massive amounts of data;
- negligible shelf storage space for such data;
- excellent data permanence (at least 10 years);
- transportability (unlike most magnetic storage media);
- the availability of "juke boxes" which can provide rapid and simple on-line access to hundreds of ODDs;
- unlimited browsing at no expense (unlike remote, on-line databases where the telecommunications line charge "clock" is always ticking);
- local control of data and total privacy while using it;
- multi-media capacity - ODDs can store and retrieve any form of image, sound and computer data;
- high resolution;
- durability (resistance to dust, vibration, hnadling, magnetic fields and general wear and tear);
- precise, high-speed random access;
- low error rates;
- high data transfer rates;
- non-erasability (where this is required).[318]

---

317. Anne A. Armstrong, "CD-ROM's high capacity, low cost tempt business users", Computerworld, (March 3, 1986), p. 40.

318. This list has been derived from a survey of available literature on optical data disks and is meant to be illustrative rather than exhaustive.

For these reasons, forecasters are optimistic that the market for optical data disk technology will be enormous. A study by LINK Resources Corporation predicts that by 1990 the U.S. installed base of read-only optical disk players in publishing applications will reach 747,700.[319] The publisher of Disk/Trend News is even more optimistic:

> To date, more than 11,000 CD-ROM players have been shipped worldwide, the majority of which has been sold to systems integrators ... By 1990 there will be more than five million installed CD-ROM drives, more than 74 million CD-ROM disks will be sold, and revenue for CD-ROM drives will hit $500 million.[320]

Other industry observers estimate the market for optical data disks at $4 billion by 1990.[321] Still other analysts predict ODD sales in excess of $7.5 billion in North America between 1986 and 1990.[322] Most of these parties have a vested interest in the ODD field, and it is probably wise to keep in mind the similar overheated atmosphere that surrounded the commercial introduction of videotex in the early 1980s. Nevertheless, it seems safe to conclude that ODD technology will have a substantial impact on the way that electronic content is delivered to the consumer, provided that some care is taken to ensure that the content is appropriate to the medium.

In Canada, a recent study carried out for the Department of Supply and Services entitled A Management Strategy for Optical Data Disc Technology in the Federal Government has estimated that the Canadian market for optical data discs and related technologies will be about $750 million between 1985 and 1990 and that the federal government will account for about $150 million of that demand.[323] This national picture is expected to break down as follows:

Hardware	-	$ 74 million
Systems (e.g. management information systems development)	-	$375 million
Software	-	$113 million
Support services (development, implementation and operation services)	-	$188 million
Total:		$750 million

---

319. "Optical Disk Strategies for Electronic Publishers: LINK Research Study","Videodisc and Optical Disk, Volume 5, Number 5, (September-October 1985), p. 348.

320. Maura McEnaney, "High industry interest, few products mark compact disk show", Computerworld, March 10, 1986, p. 8.

321. "IGC announces a new executive briefing program on CD-ROM", undated news release from the Institute for Graphic Communications Inc., 375 Commonwealth Avenue, Boston, Massachusetts.

322. Peter J. Lowry, p. 106.

323. Michael Gurstein et al. (reference footnote #312), p. 65.

The report also analyzes the prospects for a Canadian optical data disk industry and concludes that these are not very promising for a variety of reasons, chief among them the fact that we have no existing industrial base sufficient to compete with the Japanese and the Americans: A number of strategies are suggested and rejected including:

- encouraging a multinational to develop a product in Canada;
- stimulating a joint venture between a Canadian firm and a multinational which would give the Canadian firm a domestic production capacity;
- supporting "start-up" ventures or expansions of existing Canadian firms.[324]

The report concludes that the best strategy would be to focus on "niches and vertical markets", an idea which probably has a good deal of merit given the difficulties of competing "toe to toe" with the Americans and the Japanese in larger markets. However, the lesson of Telidon does not appear to have been completely learned: most of the suggestions in the report are aimed at the hardware manufacturing sector. Little attention has been devoted to the "software and support services" category which, according to the report's own figures, will account for over $300 million of the projected 1990 market. This is precisely the area where opportunity for the cultural sector may lie, and the nature of this opportunity will be explored in greater detail in sub-section 6.5.4.3 below. But, first, a brief look at cultural use of ODDs to date may help to set the stage.

Cultural Applications

Cultural organizations have been among the earliest users of ODD technology (both the Write-Once, Read-Many (WORM) variety and the more recent CD-ROM). The reason for this is obvious: cultural organizations have more information than they know what to do with. Storing it, retrieving it and distributing it has always been an enormous problem (as the descriptions in section 6.1, "Databases and Networks", make clear).

By way of illustration, the book and journal collection of the National Library, the Public Archives, the Canada Institute for Scientific and Technical Information (CISTI) and a number of large federal departmental libraries totals about 10 million volumes and 20 million microfiche, or about 15 billion images of text and graphics. All this could be stored on 50,000 optical data disks. However, the conversion cost could amount to $450 million and take up to 20 years.[325] The National Archives in the United States has holdings of about 16 billion pages of images, 16 million photographs and 5 million maps and charts and is now undertaking a pilot project to determine the feasibility of converting these documents to

---

324. Michael Gurstein et al., p. 79.

325. Michael Gurstein et al., p. 57.

optical format. Besides the obvious storage advantages, archivists favour the technology as one means of reducing wear and tear on fragile old documents and, perhaps, even enhancing their images.[326]

Some of the most noteworthy library and archive experiments with optical data disks include:

- The Library of Congress's DEMAND (Digitized Electronics MARC and Non-MARC Display) project which uses a laser scanner to digitize images of library catalogue cards, copies of which are sold to other libraries. (The Library of Congress receives over 2 million card orders per year.) In 1984, it was estimated that it would take five years to put all 5.5 million catalogue cards on disk, but that they would occupy only 24 ODDs when the project is completed.[327] Currently, the Library prints cards on demand from the ODDs but does not market the disks themselves. However, several value-added information providers (see below) have re-packaged or intend to re-package parts of this database for sale on videodisc and CD-ROM.

- The Library of Congress's Optical Disk Pilot Program (1983-1986) which is capturing up to 500,000 images per year, mostly of high use current periodicals such as government documents on public affairs topics; journals in science, technology and business (in several languages); and documents such as the U.S. Budget and Congressional Record.[328] Library patrons can consult the disks at 12 viewing terminals located throughout the complex and can use a convenience printer nearby to produce hard copies of articles.[329]

- the EURODOCDEL project in Europe, in which 60 users, including major libraries are participating. Launched in 1984, one part of the project involves digitizing the full text of 3,000 European Economic Community documents, storing this information on an ODD and making it available to users by mail, high speed facsimile or satellite link.[330]

- Ongoing experiments by the Public Archives of Canada involving the use of ODDs to store and retrieve archival data. Considerable work has already been done to transfer machine-readable data from computer tape to optical data disk and back again. The PAC has also experimented

---

326. Mitch Betts, "Federal agencies driving market for optical disk storage", Computerworld, April 14, 1986, p. 13.

327. Henry and Elizabeth Urrows, "Laser-Data, Mnemos and Other Data Disks: The Race to Store and Retrive with Optics", Videodisc and Optical Disk, Volume 4, Number 2, (March-April 1984), pp. 146-7.

328. Henry and Elizabeth Urrows, p. 147.

329. National Library of Canada, p. 8.

330. National Library of Canada, p. 9.

> with digital reproduction of black-and-white and colour photographs, but is not yet convinced that the picture quality satisfies archival standards for photographic prints.[331]

One observer has suggested that "Optical-disk-storage systems might prove to be the greatest technological innovation for libraries since the microcomputer".[332] If so, the CD-ROM is likely to be responsible:

> Optical drives that are capable of interfacing with popular microcomputers will allow even small libraries to extend their capacities for data storage and information handling to levels previously available only to those that could afford mainframe computers. This technology is so inexpensive that most libraries will be able to make it directly accessible to patrons.[333]

Several commercial firms are already using CD-ROMs to distribute bibliographic records. The following list is only a sampling:

(1) "Bibliofile" is a MARC-based CD-ROM distributed by the Library Corporation that contains 1.5 million bibliographic records from the Library of Congress's English language catalogue dating from 1964;

(2) "Any-Book", also distributed by Library Corporation, contains every book currently being published in the United States, and has now been converted from microfiche to CD-ROM;

(3) "Online Union Catalog", distributed by OCLC (Online Computer Library Centre Inc.), contains 13 million bibliographic records collected from the Library of Congress annd OCLC's 6,000 member libraries. It was being converted to CD-ROM in the spring of 1986;

(4) "Books in Print" and "Ulrich's International Periodicals Directory" was released in CD-ROM form by Online Computer Systems in June 1986;

(5) "LAWMARC" which contains bibliographic information on the entire Library of Congress law collection is to be released shortly on CD-ROM by Carrollton Press (a company recently purchased by International Thomson);

(6) "The Cumulative Book Index" and "The Reader's Guide to Periodical Literature", published by H.W. Wilson Publishing Company, will soon be released on CD-ROM.

---

331. Public Archives of Canada, Annual Report 1984-1985, Ottawa: Minister of Supply and Services, p. 104.

332. Norman Desmarais, "Laser Libraries", Byte, Volume 11, Number 5, (May 1986), p. 246.

333. Norman Desmarais, p. 246.

(7) A CD-ROM loaded with the complete records of the entire MARC-S Serials file (over 250,000 records) is available from the Faxon Company. This disk contains links to Faxon's MicroLinx system, a micro-based serials control database that can be adapted to an individual library's needs.[334]

It should be noted that all of these services allow the subscriber libraries to extract records from the CD-ROM, create their own unique databases on floppy or hard magnetic disks and edit them in any way they please.

In the museum world, the potential applications for optical data disk technology are also enormous. One museum consultant has identified a number of reasons why ODDs are likely to be introduced:

> We deal in very large quantities of data, which change rather little. Pictures and diagrams are vital to us, as are sounds in some fields of study. Our research relies upon massive, costly, indexed tomes of historical, geographical and biographical data. We have an obligation, generally unmet, to publish our documentation including color images.
>
> * * *
>
> Finally, the manipulation of images by computer will support entirely new forms of research, such as objective studies of style in the arts ... much as the thought may repel some scholars, there is much to be learned from pictures through statistical analysis of the slant and curvature of line, distribution of shade and color, and the size and shape of forms. The measurements and calculation would be unbearably tedious for a person but everyday work for a computer.[335]

An optical disk study was carried out by the National Museum of Man in late 1985 to:

(a) produce a variety of optical and videodiscs and to demonstrate their use in a museum environment;

(b) investigate affordable methods of visually capturing museum artifacts;

(c) test the linking of "tombstone" collections data to the images;

---

334. Further information on these applications can be found in the Norman Desmarais article, cited above, and in "Faxon Links CD-ROM to Library Serials Services", Optical Information Systems, (January-February 1986), pp. 22-3.

335. David Vance, p. 2.

(d) test simple microcomputer database programs to determine their suitability for use with various types of imaging equipment and disks;

(e) develop a system which would enable the user to browse through the visuals and be automatically connected to the collections data (and vice versa).

Personnel from the National Museum of Man, the Photo Service of the National Museums of Canada, the Canadian Heritage Information Network (CHIN) and the National Film Board were involved in the project. A number of ODD systems were tested including:

(a) the Control Data OSI-1200, a digital WORM system that produces disks at the user's facility;

(b) the GEAC Computer G1000, another digital WORM system produced by an all-Canadian company;

(c) the Panasonic OMDR, an analogue WORM system.

The same video camera was used to provide input to all disk formats. Levels of resolution were tested utilizing a variety of material, including film strips, slides, photographs, X-rays and microfilm. Ater the image was captured, textual information could be added, if desired, enabling recall of the image upon input of the object's name. Some systems tested better than others, but good digital image capture was found to take up very large amounts of space, generally in the order of 200,000 to 250,000 bytes per image. A one-gigabyte ODD manufactured by the Control Data system, for example, was able to store only 40,000 black-and-white images or 4,000 colour images. Some problems were also experienced interfacing collections information with digital images, but this was mainly due to the inadequacies of the off-the-shelf database management programs tested for this purpose.[336]

Despite the inconclusive technical results, Museum of Man officials were convinced that optical data disks and videodiscs will play an important role in the museum of the future in such areas as:

(1) collections management;

(2) client-public information;

(3) exhibit information;

(4) income generation (ie. through the sale of disks).

---

336. A complete description of this project can be found in an undated paper by Fred Granger of the National Museum of Man entitled "Optical Disk Study" (PIP-NMM-03).

Finally, a whole range of publishing possibilities on CD-ROM format may soon become a reality. As this is being written, a great many projects are being announced in the literature, but very little has actually reached the marketplace. Nevertheless, before this flood is released, it is already possible to discern some patterns.

The biggest initial users of the technology (after libraries) are likely to be the financial, business and scientific database services, most of which currently maintain their data on-line through the telecommunications system. The reason for this is obvious: the ability to explore a database and to browse at leisure is much enhanced if telecommunications charges are not a consideration. There is a psychological factor at work here as well, somewhat akin to the change that took place in computing when micro-computers gave users the freedom, flexibility and local control that had been impossible using a centralized mainframe. Most industry analysts now predict that on-line database services will be confined to only the most recent data and that database publishers will issue sets of CD-ROMs with regular subscription updates to clients wishing to have access to archival or "tombstone" data. In fact, several on-line database publishers, such as Datext Inc. (publishers of the Corporate Information Database) and the Disclosure Information Group (publishers of Medline and the Life Sciences Collection), are already distributing on CD-ROM format, and many others are expected to follow.[337]

Another area which is beginning to receive attention is full-text publishing on ODDs, something which is perhaps more relevant for cultural information providers such as traditional publishers. The first consumer-oriented, full-text, CD-ROM product came on the market in 1985. It is the Academic American Encyclopedia published by Grolier Electronic Publishing, a 21-volume text-only set which occupies about one-fifth of the CD-ROM on which it has been released. Retailing for $199 (U.S.), the disk can be searched using an electronic index according to groups of words, keywords, concepts in context and article title in less than five seconds."[338]

Another cultural application, according to one observer, will likely be in the field of art books:

> Art books ... are expensive to produce in paper and could be published on optical disks at prices comparable to or less than a paper edition. High-quality graphics and text can be combined economically for widespread distribution. This type of publishing will make mutilation and destruction of expensive books a thing of the past. It will also allow users to tour art museums without leaving their desks.[339]

---

337. A survey of the situation in spring 1986 can be found in the Norman Desmarais article (reference footnote #332).

338. "Grolier Publishes Academic American Encyclopedia on CD-ROM", Optical Information Systems, (January-February 1986), p. 24.

339. Norman Desmarais, p. 244.

Full-text optical publishing does not imply that readers will sit at screens to read whole novels. What is more likely to occur is "demand" publishing, where users will scan material from the ODD on a computer screen then print copies on a high-resolution laser printer. This is already happening with such services as OCLC's "Graph-Text", a CD-ROM product containing articles from a variety of American Chemical Society journals.[340]

The latest wrinkle in optical data disk publishing emerged at a recent international conference on CD-ROMs, adding yet another acronym to the bewildering optical disk vocabulary - CDI. CDI stands for Compact Disk-Interactive, a set of specifications for CD-ROM backed by Philips and Sony (the same partners in the development of compact audio disk standards). According to industry observers, this will have two important implications:

> By defining how data for video, graphics, and sound are encoded on the disc, it standardizes a multimedia format. By specifying a microprocessor family (Motorola 68000) and operating system (CD-RTOS, based on OS 9, made by Microware of Des Moines, IA), it enables real-time applications such as entertainment and education/training, and ensures that CDI discs carrying audio, video, text, binary data, and applications programs will work on all CDI drives from all manufacturers.[341]

CDI is said to be six times more efficient for storing video than CD-ROM, although motion video is still not possible. Applications envisioned for this ODD technology include:

(1) entertainment (music with text, notes and pictures, various types of games);

(2) education and training (reference books, talking books, interactive training);

(3) creative leisure (drawing, filming, composing);

(4) work at home (information rerieval and analysis);

(5) in-car use (maps, navigation, tourist information).[342]

One company, the Record Group, is currently working on about 20 titles for this medium, including a genealogical maze game with the working title "Princess Di is Related to Chiang Kai-Shek".[343]

---

340. Norman Desmarais, p. 244.

341. "CDI is the new buzzword in home entertainment: A report from Microsoft's conference on CD-ROM, "Viewdata/Videotex Report, Volume 7, Number 3, (March 1986), pp. 10-11.

342. "CDI is the new buzzword in home entertainment: ...", p. 11.

343. Loc. cit. p. 13.

6.5.4.3 Discussion

What does this all mean for the Canadian cultural community? What are the prospects that optical storage technologies will become widely used media? And how might the cultural community best take advantage of the opportunities offered by this technology?

One way to start to answer this question is to return to the "television" model discussed in sub-section 6.5.3.3 on videotex. This model, it will be recalled, divided the industry into four segments:

- program production and creation;
- wholesale distribution;
- retail distribution;
- consumption.

The optical disk market is only beginning to emerge, but it is already becoming evident that the distribution categories are taking shape much more rapidly than the production and consumption ones. On-line database firms and large home entertainment companies such as Pioneer and Philips have invested heavily in both the hardware and software aspects of optical storage technologies, and both of these players are taking advantage of their existing distribution networks to bring their products to the consumer. However, as with videotex, the economics of production and the behavioural aspects of consumption are less well-defined. This paper will examine each in turn, although it should be kept in mind that there is much less "hard data" to go on than in the case of videotex due to the recent nature of much of the technology.

Consumption or Demand

At this point, very little is known about the consumer demand for content on optical disk formats. It is known that passive consumption of videodisc movies was not a success because it provided less flexibility than the videocassette. Only within the last few years have electronic publishers begun to exploit the interactive capabilities of the videodisc in education and retailing. Similarly, the industry is now attempting to position the optical data disk as an interactive tool, specifically one that takes a "broadcast" medium (such as an encyclopedia), hands it to the user and allows him/her to do his/her own "narrowcasting" by manipulating the content to suit individual needs.

The cost of optical disk technology, at least to the consumer, promises to be relatively low. Once master disks are prepared, copies can be pressed indefinitely. For the user, this represents a one-time cost, unlike telecommunications charges or usage fees which are incurred every time one consults an on-line information provider.

The ability to control the technology is perhaps its greatest advantage. Gary Kildall, the inventor of the CP/M operating system used in microcomputers like the Apple, is now president of Knowledgeset Corporation, the firm that designed and produced the CD-ROM version of the Academic American Encyclopedia for Grolier. The rapid random access capability of CD-ROMs, he believes:

> ... really opens that data base up. All of a sudden you've got your blinders off. An on-line system is like looking through a little peephole at your data. People will say, "I want to have my data on CDs, rather than have it on-line." The natural effect is that data that's on-line now will be reduced to the most recent stuff.[344]

With CD-ROM, the user enjoys the added bonus of being able to download and manipulate the data, an option that was not generally available on most of the videotex trials. He or she also has some degree of choice over the final form in which the product will be consumed - either "raw" from the screen of the computer monitor, "semi-finished" on a personal computer database assembled from CD-ROM content or "finished" as hard copy printed out from either the CD-ROM or the personal database.

Videodisc and videotex have both been promoted as interactive technologies, but videodisc seems to appeal more to educational and retail sales markets due to the greater variety of materials that can be incorporated into the medium (ie. motion video, photographs, paintings, manuscripts, handwriting, and film strips as well as real-time computer animation and text overlays). Videodisc's 54,000 images and CD-ROM's 540 to 600 megabytes are also formidable advantages. This storage space can be filled with optically scanned material far more easily than an on-line database can be loaded with videotex pages, especially when graphics are involved. Any time sensitivity that is lost is probably compensated for by the permanence of the recorded data, which promises to rival that of the traditional hard copy.

Given these format qualities, who is likely to consume information presented on optical disks? The discussion of videotex suggested that intensity of consumer interest would be the key factor governing the success of electronic information delivery systems because, when information is consumed on a "pay-as-you-go" or transaction basis, the user must want it enough to pay the cost. Does this hold true for optical disk technology as well? The answer appears to be "yes" and "no".

Optical disk technologies are certainly more of a mass medium than videotex. Despite their downstream flexibility and their interactive properties, they can be bought and sold as a bulk commodity. The user is freed from the tyranny of the transaction: once paid for, the optical disk is "owned" in the same way that a book or a newspaper is owned. The flip side of this situation is that only certain types of consumers are going to want to purchase this much information, and only certain types of consumers are likely to invest the time and attention required to make full use of the medium. Motivation is therefore still a factor. The crucial question is, then, who are these motivated consumers likely to be?

---

344. Eric Bender, "CD-ROM to take blinders off users searching data bases", Computerworld, (March 10, 1986), p. 9.

We already know part of the answer from a survey of the current users of videodiscs and optical data disks. They are:

(1) businessmen, financial analysts and consultants;
(2) scientists and researchers;
(3) educational institutions and museums;
(4) libraries and archives;
(5) retailers;
(6) entertainment outlets such as Disneyworld and video arcades.

There is also a small consumer market for entertainment videodiscs which may or may not continue to grow. It is, however, qualitatively different from the preceding categories because it consists of relatively passive users. The individuals and organizations in the six listed groups are motivated by a need to interact with the medium, to extract vital information and/or to manipulate it.

Cultural information users and providers, other than librarians, archivists and curators, exhibit these characteristics as well. However, the high cost of data conversion to optical disk formats cannot be justified simply on the basis of use by the cultural community alone. "Cross-overs" into other markets will have to be found. At the moment, the research and educational communities and certain segments of the consumer entertainment field appears to be the best prospects, mainly because a significant proportion of the content they seek is either cultural (e.g., museum artifacts and art objects) or only accessible through cultural institutions (e.g., libraries, archives and publishers). The rush into CD-ROM bibliographic databases and the many educationally-oriented cultural videodiscs (see sub-section 6.5.4.1) tend to confirm this hypothesis.

While there will always be a segment of the research, academic and journalistic communities who will be willing to pay a premium to have a computer search out information on specific topics, this is probably not a huge market niche. Therefore, any consideration of demand for cultural information in optical form will likely have to focus on the broader educational market and certain segments of the consumer market. In education, particularly, there is a built-in audience of millions of students, most of them motivated to consume information. In the home, there may be a significant demand for self-improvement and entertainment products on optical disk - although it should be noted that videotex tried unsuccessfully to tap this market.

Production

Despite the fact that the end product, the videodisc or the optical data disk, costs very little, production requires a fairly heavy investment. Videodisc production costs run anywhere from $50,000 to $150,000, depending on the complexity of assembling the content and on who is doing the production. Stan Cornyn, president and owner of the Record Group which is attempting to break into the consumer market with CD-ROM programs in the CDI format, estimates:

> ... the cost of producing CDI programs as "at most $250,000 per title - using graduate student labor." The magnitude of a hit needed to break even (not counting the development cost of setting up the group): about 25,000 copies.[345]

Estimates for software and support services made by Socioscope Inc. in its study of optical data disk technology have already been quoted, but the detailed breakdown gives a somewhat better picture of the scope of these expenses:

> Software Market
>
> In the software segment of the market, we include the development of specialized software required to customize particular applications of optical data discs. The storage and identification of customer signatures within the banking environment might be an example of a specialized software requirement. We exclude from this segment the imbedded software of optical data disc systems ... We estimate this segment to comprise approximately 15% of total spending; leading to $23M annual spending by the Federal Government in 1990 and $113M for the whole of Canada.
>
> Support Services
>
> Under the support services segment of the market, we include secondary activities required for the development, implementation and operation of optical disc systems. One of the largest of these is the conversion of existing data in paper, film, videotape, microfilm, microfiche, etc. form to optical storage. We also include under this market segment the development of special data base systems to facilitate storage and retrieval of information, interactive computer-aided learning, for example, the development of interactive training programs and manuals, entertainment applications and media distribution. We estimate this market segment to comprise approximately 25% of total spending on optical storage technologies; leading to $38M annual spending by the Federal Government in 1990 and $188M for the whole of Canada.[346]

Such estimates tend to confirm the statement by Gary Kildall, President of Knowledgeset Corporation, that, "You can't put together an encyclopedia (or an information base of that sort) yourself. It's a team effort; it takes thousands of people."[347] As producer of the Academic American Encyclopedia, Mr. Kildall speaks from a position of authority. It is therefore worthwhile to take heed of what he has to say about the need to combine sound business sense with "showbiz" when producing information for optical disk format:

---

345. "CDI is the new buzzword in home entertainment: a report from Microsoft's conference on CD-ROM", p. 14.

346. Michael Gurstein et al., pp. 63-64.

347. Quoted in Eric Bender (reference footnote #344), p. 9.

> To make the whole thing successful, the real key is to make it very easy for a publisher to bring his current materials into CD form and then take those materials and work with them to take advantage of the multimedia capabilities.
>
> We don't want to go out there and do the Library of Congress, for example, or do all the public-domain programs. People would look at that and say, "Oh, that's really nice" and then go on to something else. But if you can really give people ways they can explore and have fun at the same time, that's the real key to it.[348]

A number of other American companies, including such giants as Digital Equipment Corporation and smaller, more specialized optical storage firms such as Reference Technology Inc. and International Standard Information Systems (I.S.I.S.) are also offering CD-ROM disk production services to assist clients in moving data onto compact disks.[349] It is now time to ask whether Canadian companies and Canadian cultural content providers can adopt a similar strategy to take advantage of emerging markets.

Any venture to put more cultural content in optical disk format on the market will, first of all, have to involve a partnership of some sort between a number of sectors, simply because there are not enough financial resources or expertise concentrated in one area to do the job alone. At a minimum, the following players should be involved:

(1) The federal government - As a priority, the government should provide sources of funding for research and development, start-up ventures and pilot projects. Expertise residing in the National Library, Public Archives of Canada and the National Museums of Canada should also be tapped.

(2) The library, archives and museum communities - As custodians of huge amounts of historical and bibliographic content, they have pressing internal needs for optical storage technology. There is also a potential educational and consumer market for this content which should be explored in partnership with publishers, educators and the private sector.

(3) The publishing community - Practically all that is produced by the publishing industry is amenable to optical storage. However, the industry currently lacks experience in this area and likely does not

---

348. Eric Bender, p. 9.

349. See particularly "Reference Technology Introduces CD-ROM Laser Disc Drive for IBM-PC", and "Digital Equipment Corporation Introduces CD-ROM System", both in Videodisc and Optical Disk, Volume 5, Number 5, (September-October 1985), and "The Silver Platter Electronic Publishing Service", Videodisc and Optical Disk, Volume 5, Number 4, (July-August 1985).

have the resources to pursue research and development on its own. Potential applications could include demand publishing of works stored on optical data disks and development of interactive videodisc and CD-ROM products for the educational and training markets.

(4) The educational community - Production of courseware is a time-consuming and exacting business. A great deal of expertise in this area resides in the educational community and could be potentially useful in converting cultural content to interactive optical disk format. Reciprocal benefits for educators would include access to a great deal of valuable content which could be tailored specifically to curriculum needs.

(5) The private sector - There is definitely a market niche emerging for production companies capable of assembling attractive and interactively interesting optical disks. In Canada, a few videodisc production companies such as Interactive Image Technologies Inc. of Toronto and Gastown Productions of Vancouver are already active. They, and perhaps other companies, should be involved in any cooperative venture aimed at promoting and producing cultural content in optical format.

The Department of Communications should take the lead in developing such a partnership. Its responsibilities in the area of culture and its commitment to the fostering of advanced communications technologies can both be addressed within the scope of this initiative. This paper has already said much about the opportunities which lie in harnessing the creative talents of the cultural community to the power and versatility of computer technology. This is a point of view which fits well with Canadian realities. Our hardware has great difficulty competing with Japanese, American and European products because of their economies of scale and huge investment pools. But we are very well positioned to take advantage of our unique and massive stores of information and the talents of our well-educated workforce. We should take heed of some recent observations by Arthur D. Parker, president and chief executive officer of Utlas International Canada, a Toronto company providing computer services to the library and information industry:

> Canadians can be extremely successful if we concentrate on the use of computers, the building of information databases and the dissemination of information. I am referring, of course, to the value-added aspects of this area of information processing.
>
> The economy of scale concept so vital to profitability in the hardware sector can, if redefined as the economy of small scale, operate to the advantage of Canadian software and database producers eager to harness export markets. In this area the uniqueness and quality of the idea or information cannot easily be overwhelmed by sheer size.[350]

---

350. Arthur D. Parker, "Size isn't everything", Canadian Datasystems, (April 1986), p. 94.

Utlas has been successful in selling its data in such unlikely places as Japan. As Mr. Parker says, "There is a very interested world out there that can use much of what we have developed." He suggests that the federal government would do well to provide research and development funding for computer applications in this area. In his view:

> ... a number of systems and databases created to satisfy the Canadian market are not less sophisticated than those used in the United States but in many cases are actually more developed.
>
> * * *
>
> It is an area where Canadians can shine internationally and where I believe our future lies in the information age. We can get away from our image as "hewers of wood and drawers of water" in this new era by being the best in applying computers to the whole range of information needs.[351]

Canadian success in this area will depend on whether we have the will and the commitment to marshall our existing resources in such areas as optical disk technology. Leadership by the Department of Communications will be vital if the cultural community is to benefit from the promise extended by the information age.

---

351. Arthur D. Parker, p. 94.

7. TECHNOLOGY AS AN ARTISTIC TOOL

7.1 Musical Preludes

The last few years have seen the merging of the arts with new technologies such that composers have become maestros of the micro and paint boxes have gone digital. In music, computer technology was applied two decades ago in the development of the synthesizer. More recently, more sophisticated computer-aided compositions have been developed, and some observers now feel that within the next few decades computers will cause a revolution not only in instrumental music but in voice-like synthesis as well.[352]

While music "was probably the first art form in which the computer was used for serious and continuous work"[353], in actual fact, musicians have been tinkering with electricity since at least 1897, when the Canadian inventor Thaddeus Cahill demonstrated his sounding stave, an electric device for the control of timbre. While the orchestras of his day were concerned with Berlioz or Rossini, Cahill was applying for a franchise to lay wires in the streets of New York for the purpose of distributing music electrically. By 1906, when Cahill demonstrated his 200-ton telharmonium - which generated sounds by rotating toothed wheels in an electromagnetic field - composers had begun a search for an alternative to the classical tradition of tonal thought. Arnold Schoenberg's further break with diatonic harmonies in 1908 made any combination of pitches permissible. Composers began to explore timbral relations and tonal qualities. Technological advances in the period around the First World War granted musicians the opportunity to experiment with abstract sound, unhampered technique and unlimited tonal material.

The Italian Futurist Luigi Russolo (who referred to the traditional concert hall as a "hospital for anemic sound") produced his intonarumori in 1913. These were elaborate and bulky noisemaking mechanisms, which Russolo operated on stage in Paris and London. Russolo was intrigued with the rhythmic quality of machine sounds, and defiantly described his work as "noise music".[354]

American inventor Lee DeForest perfected the first oscillator (a source of periodic changes in voltage for the production of pitch and timbre) in 1915. New instruments, such as Leon Theremin's etherophone (1923), Maurice Martenot's ondes martenot (1928) and Friedrich Trautwein's trautonium (1928), were introduced in quick succession. In 1929, A. Givelet and E.E. Coupleux devised a musical synthesizer that used four

---

352. Leopold Froehlich, "Give Tchaikowsky the News", Datamation, Vol. 27, No. 11, October 1981, pp. 130-140.

353. Lars Gunnar Bodin of the Electronic Music Studio in Stockholm, cited in Leopold Froehlich, (footnote #352).

354. Leopold Froehlich, p. 132.

oscillators controlled by a punched paper roll. Laurens Hammond produced the first electronic organ in 1929, which allowed the performer to control timbre, pitch, and volume.

Edison's and Berliner's invention of the phonograph in 1878, along with Valdemar Poulsen's invention of the wire recorder in 1898, had made possible the storage of electronic sound; in 1935 the invention of the first tape recorder, the magnetophone, enabled the composer to move beyond rudimentary sound manipulation. It became possible to vary speed during playback, to play sound backwards, to alternate between sounds by splicing or montaging or to augment sound further by overdubbing. The plasticity of sound had been extended.

The commercial availability of the tape recorder around 1950 furthered efforts toward dealing with found noises and pure sound. By 1953 the field of electronic music was flourishing. Karlheinz Stockhausen with Herbert Eimert and Werner Mey Eppler, had established the Elektronisch Musik studio in Cologne, where they used sounds made by sine wave generators manipulated by tape recorder. Their work along with the efforts of Vladimir Uschevsky and Otto Luening at Colombia University in the 1950s, typified the music to emerge from the so-called classical electronic music studio.

Such early efforts were hindered by the rudimentary technology of the analogue synthesizer, and constrained by the difficulties presented by tape splicing. The establishment, in the early 1950's, of the National Research Council's Electronic Music Laboratory (ELMUS) in Ottawa was an important beginning in the development of electronic music in Canada. Historically, the most important figure to play a decisive role in the development of electronic music in Canada is Hugh Le Caine, ELMUS' director who over a period of about 20 years produced numerous instruments of original design (the Serial Structure generator and the touch-sensitive keyboard - two devices designed to automate the more tedious studio operations - the sine bank, the multi-track special purpose tape player, sonde, etc.) and composed many pieces to illustrate the possibilities of these instruments. As Le Caine would later tell a reporter "one of the real driving forces for me in electronic music was that it seemed there just had to be an easier way to get a trumpet sound than by blowing on a trumpet.[355] Robert Moog, inventor of the Moog Synthesizer also stated "if I wanted an instrument that sounded like a violin, I would build a violin."

Few of Dr. Le Caine's inventions are still in use in Canadian studios. By the mid-1970's commercial electronic instrument manufacturers, notably the Japanese, started bringing out off-the-shelf, computer-chip-based electronic music instruments which quickly overtook or bypassed much of what Dr. Le Caine had developed.[356]

---

355. Stephen Strauss, "Making music electronically", The Globe and Mail, June 26, 1974, p. 56.

356. Much of the information in the previous paragraphs has been derived from Clifford Ford, Canada's Music: An Historical Survey, GLC Publishers Limited, Agincourt, Ontario, 1982.

Le Caine's collaboration with Arnold Walter at the University of Toronto and with Istvan Anhalt at McGill University resulted in the development of their electronic music studios (with the University of Toronto studio established in 1959 and McGill's in 1964). At ELMUS, a computer system was developed between 1968 and 1972 which permitted composers to write their music into the computer using standard notation, or by means of an organ type keyboard. The music could be subjected to many kinds of modification and manipulation and the results then played.

The first director of the University of Toronto's Electronic Music Studio (UTEMS), Myron Schaeffer, developed the Hamograph, an amplitude control device. During the 1960's the studio attracted many composers from Canada, the United States and Europe including Lowell Cross (USA), a doctoral student and research assistant, who developed systems for controlling light and video immages using electronic sound, produced electronic compositions, and compiled a bibliography of electronic music.

In addition to being a traditional analog studio, UTEMS concerned itself with the development and use of computers. During 1971 to 1972, UTEMS also implemented a "Music IV" type of program called Outperform. This was adapted by David Jaeger and was used not only for original sound synthesis but also for teaching computer techniques. In 1977, William Buxton of the Computer Systems Research Group of the University of Toronto, began developing a graphics oriented digital synthesizer (Structured Sound Synthesis Project) in co-operation with the Faculty of Music.[357]

In 1967, at Simon Fraser University, R. Murray Schafer founded the Sonic Research Studio in cooperation with the Department of Communications Studies. In 1971 Schafer initiated the "World Soundscape Project", the aim of which was to bring together research on the scientific, sociological and aesthetic aspects of the acoustic environment.[358]

---

357. Composers who worked in the studio in the 1970s included members of the Canadian Electronic Ensemble, Bruce Pennycook and Dennis Patrick (Phantasy for oboe and tape, 1976). Early users of McGill University's electronic music studio included Pierre Mercure (Forme des Choses, 1964, film), R. Murray Schafer (Loving, 1965), and Paul Pedersen (Phantasie, 1967). Pedersen, the studio's director between 1971 and 1974, began using computers for sound synthesis and composition in the mid-1960s. His Serial Composition (1965) for violin, horn, bassoon and harp was composed with the aid of a computer program.

358. Members of the project included Bruce Davis, Peter Huse, Barry Truax, and Howard Broomfield. Barry Truax who became director of the studio in 1975, has developed and installed his POD (1973) computer programs. The system features interactive composition and real-time FM sound-synthesis.

In the late 1960's and early 1970's, other electronic music studios emerged - at the University of British Columbia in 1967, at Laval University in 1969, at York University (in 1970, by James Tenney), at Carleton University (in 1974, by David Piper), at the University of Western Ontario (in 1972, by Peter J. Clements), at Queen's University (in 1971, by David Keane), at Dalhousie University (in 1971, by Steve Tittle), at the University of Calgary (in the early 1970s, by Warren Rowley), and at the University of Victoria (in 1978, by Martin Bartlett).

Nil Parent who established the studio at Laval also formed the Groupe d'interprétation de musique electroacoustique in 1974, whose members have performed compositions in which the sounds from traditional instruments are transformed electronically. The Groupe informatique-musique, formed in 1971 at the University of Montreal developed a sound synthesis program and conducted research into score analysis.

While most composers work in the institutional studios mentioned above, other individuals developed private studios. The availability, in the late 1960's and early 1970's, of packaged synthesizers - Moog, Buchla, EMS (London) for example - increased the use, of electronic music in commercial and popular idioms. Keyboard synthesizers came into wide use by pop music groups. In 1977 the Association pour la création et la recherche électro-acoustique du Québec (ACREQ) was founded in Montreal to encourage creation and research and promote international exchange.[359]

7.2 Electronic and Computer Music

In the 1950's and early 1960's the computer was regarded as a plausible composing machine (with given data). More recently, the computer has been used as a memory capable of producing desired sound in exact sequence. Work today is based not so much on composition as on the analysis and synthesis of sound via computer. The man most responsible for this development is Max V. Mathews of Bell Labs in Murray Hill, N.J. who has been called the father of computer music and is considered a man as important to the development of music as the inventor of the piano.[360]

His Music IV and Music V programs were of great significance to computer music because they let musicians work with the computer without being overwhelmed by technical concerns. Mathews' GROOVE program, allowed for "edited improvisation" between machine and performer, thus freeing computer music from the barren rigidity of unchanging performance.

In working with the computer for the generation of music, one finds that nothing is indicated or left to the performer, as in the instruction "adagio". Instead, everything must be realized by the composer. Access to

---

359. ACREQ was founded by the composers Yves Daoust, Marcelle Deschênes-Harvey, Michel Longtin, Philippe Ménard, Jean Sauvageau, and Pierre Trochu.

360. Leopold Froehlich, "Give Tchaikowsky the News", Datamation, Vol. 27, No. 2, October 1981, p. 132.

the computer thus raises special problems - physical, economic and cognitive. The physical and economic situation is improving: computers are becoming available in more and more centres, partly because they are becoming less expensive. The cognitive problem is also improving, but using the computer still puts heavy demands on the composer. Dick Armin, a veteran cellist with the Toronto Symphony had to spend ten years learning the laws of physics and acoustics, theory, design and construction before he could create the string player's answer to "electronic intimidation": the RAAD electric is a standardized string instrument (violin, viola, cello or contrabase) which disposes of a standard pick-up lodged inside the instrument to make way for a thin, polarized strip of film that performs the same task better.[361]

So why resort to the computer, which is such a complicated and apparently unmusical tool?

There are a number of possible answers, the simplest one being: because it is there. After all, why should 20th century composers use 18th and 19th century instruments when all the resources of modern technology are at their disposal? In fact, those who have decided to spend a substantial amount of time and effort in the field of computer music have done so for specific and musical reasons - not just to use a new gadget.

Some composers have called on the computer for help or enlightenment in the compositional process or to "develop the consequences of a musical idea":[362] others have called for computer technology to develop a tool affording easy and quasi-instrument access to a "palette of timbres".[363]

Other composers' emphases or biases are more inclined toward having a refined control of sound structure. Digital synthesis and processing of sound permit this control and can afford sound material of unprecedented clarity permitting not only composing with sounds, but composition of the very sounds themselves. For some, this is the most promising avenue opened by digital techniques in music.

Since World War II, new music has indeed been influenced by the rapid progress of recording technology. Concrete and electronic music have vastly increased the sound material at the disposal of the composer, and they have had already a large impact upon composing ideas, but they each still have decided limitations. A number of composers use the resources electronic music offers for their creative skills while other composers call upon these resources only occasionally.

---

361. Paul McGrath, "Making a violin R2-D2 would enjoy", The Globe and Mail, March 23, 1985, p.E2.

362. Jean-Claude Risset, "The Musical development of digital sound techniques", UNESCO, Computer Music Report on an international project including the international workshop held at Aarhus, Denmark in 1978, Canadian Commission for Unesco, Ottawa, 1980, p. 128.

363. Ibid., p. 128.

"Musique concrète" makes any recorded sound available for musical composition, thus providing a considerable variety of natural sounds with complex structures. But these sounds can only be transformed in ways that are rudimentary by comparison with the richness of the material, leading to the danger of capitalizing on sound effects. Electronic music, on the other hand, affords a precise control of the structure of electronic sounds - of very simple and rather dull sounds - which can be enriched, but through manipulations which to a large extent ruin the control the composer can exert upon them. Of course, these two processes are often intertwined: natural and synthetic sounds can be mixed together, and live electronic music blends instrumental gestures with recorded or electronic sound material. However the dilemma between richness of sound and refinement of control remains even in these more complex situations.

With computer technology, one may hope to go beyond the above-mentioned limitations. The computer permits the very precise control of the structure of synthetic sounds. This is not limited to simple tones or noises: the sounds can be elaborated in complex ways, which permits their enrichment without losing reproducibility. With digital techniques, real sounds can be processed as well in more subtle ways, through the implementation of sophisticated analysis-synthesis techniques.

Just as the development of the piano in 1709 permitted the composition of new forms of music, so the computer today represents a powerful ally of the composer by facilitating rapid composition, modification and simulation of sounds, transformation or modulation of timbres to create completely new sounds and the execution of rhythms too complex or rapid for even the most talented musicians to perform. The modern composer working in an electronic studio is at once composer, performer and recording engineer who can immediately hear the final product without having to wait months for a performance. This instant feedback permits composers to better develop their ideas. The new technical and creative capabilities open the doors to new aesthetic tastes.

Much of the music done with the computer so far has used the new possibilities in ways that can be considered rudimentary. But computer music is a recent field; certainly it is difficult to use the computer in musically creative ways and a substantial amount of research is still necessary to take full advantage of the already available digital techniques. However composers can already avail themselves of new musical possibilities afforded by the computer; access to digital techniques is expected to improve in the coming years with the advent of digital synthesizers.[364]

There appear to be at least two directions of experimentation suggested by available microcomputer synthesis systems. For composers, these programs allow scores to be entered and edited with some of the flexibility of a word processor. The results can be orchestrated and heard immediately. Runs of 64th notes beyond the dexterity of the most accomplished musicians can be played on this system.

---

364. Jean-Claude Risset, The Musical development of digital sound techniques, UNESCO, Computer Music Report on an international project including the international workshop held at Aarhus, Denmark in 1978, Canadian Commission for UNESCO, Ottawa, 1980, p. 130.

If the musician's interests are centered on the analysis and imitation of musical instruments, the systems also allow the construction of complex instrument definitions, immediate auto feedback and sound modification. These instrument sounds can be saved on disk and called up at will. The performing musician can create many new effects and can record accompaniment to enhance the performance.

Much can be done with the new hardware and many more powerful digital synthesizers are likely to become available. While performance instruments may still be in their infancy, anyone interested in the design of keyboards, digital hardware or software in connection with these new instruments may discover many exciting possibilities, provided that access to the necessary equipment is available. For the most part, access no longer appears to be a problem. While the initial technology costing from $50,000 to $60,000 was purchased only by major research facilities, the personal computer is far more accessible to artists wishing to experiment at home.

Perhaps Professor David Johnson of Carleton University's Department of Music speaks for the larger community of composers. He is a musician with background in electronics who uses a general purpose computer to produce digital sound synthesis - the opposite process of converting analogue to digital recordings: a synthesizer permits him a full editing capability. Johnson perceives the computer as a number device which permits the translation of sound into numbers using complex mathematical algorithms.[365]

The composition is thus the result of a decision-making process and the computer is also used to assist in the decision-making. While there is a "Computer Music Journal" on the market today, Johnson's perception is that a clearinghouse of information regarding computer applications and availability would well serve the (electronic) music community. Additional workshops and conferences on the subject would also be highly valuable.[366]

7.3 Dancing Partners: Computers and Choreography

Although languages for the description of human movement find application in clinical medicine, industrial time and motion analysis and in the

---

365. Telephone conversation between author and Professor Johnson on February 6, 1985.

366. In fact, the 11th Annual Computer Music Conference was hosted in Canada for the first time, from 19-22 August, 1985 at the Robson Square Media Center in Vancouver. For more information on the conference: Professor Barry Truax, Continuing Studies, Simon Fraser University, Burnaby, B.C., V5A 1S6 (604) (291-3649) or (604) (291-4565).

development of animation systems, the greatest interest has been in dance.[367]

For at least the past 500 years, some of the best minds in the world of dance have been grappling, unsuccessfully, with the problems of transferring dance movements onto paper.[368] At least 27 relatively modern forms of dance notation exist, all of them more or less useless except to those with years of training in interpreting them. There is still a need to bring the art of dance notation systems to a satisfactory level of literacy. In the United States, the most popular is Labanotation, an incredibly complicated system capable of notating even the twitch of an eyelid and using around 1,500 symbols to represent the parts of the body. In Britain, Benesh Notation, a much simpler system based on the musical stave predominates. In any event, while Labanotation as well as other dance notation systems provide the positional information of a movement, they don't show the stylistic qualities that help a choreographer visualize the spatial flow of the dance. All of the written systems are subject to misinterpretation, even by the trained eye. Also none solves the basic problem of letting dancers learn roles the way they like best: by watching bodies in action.

The difficulty with all movement notation systems is that they are inherently complex and difficult to learn. This has led to a number of proposals for the implementation of computer interpretation systems. The computer is seen as a tool which can aid in the composition and editing of the movement notation score and as an interpreter which can animate a score and thus assist in learning.[369]

At British Columbia's Simon Fraser University, researchers in the Department of computing science have as their principal goal the development of a system for computer-assisted composition and interpretation of Labanotation in order to make the notation easier to learn and to use.[370] For choreographers, the ability to visualize movements without dancers could be realized by a computer interpretation system, and computer-assisted composition of a score could provide relief from some of the tedious detail

---

367. T.W. Calvert, J.A. Landis, and J. Chapmen, Notation of dance with computer assistance, Department of Computing Science, Simon Fraser University, British Columbia, pp. 169-178.

368. Sonia Humphrey, "Dancing Partners: Don Herbison-Evans and Sausagewomen", Artforce, No. 45, Summer 1984, North Sydney, NSW 2060, p. 8.

369. J. Barenholtz, Z. Wolofsky, I. Ganapathy, T.W. Calvert and P. O'Hara, "Computer Interpretation of Dance Notation", in S. Lusignan and J.S. North (eds.) Computing in the Humanities, University of Waterloo Press, Waterloo, 1977.

370. T.W. Calvert, J.A. Landis, and J. Chapmen, Notation of Dance with Computer Assistance, Department of Computing Science, Simon Fraser University, British Columbia, pp. 169-178.

of writing and editing. For students of notation the computer system gives direct feedback, which speeds learning and provides a means to quickly check notation exercises. A practising notator might find the system useful for the verification of notated dances. Dancers, whose knowledge of notation is often quite limited, might use the computer system to check the archives of notated dances, so that with subsequent learning of these dances they could widen their repertoire and that of their audiences. The computer would provide a cursory glance at the general statement and movement patterns of the dance and might be an aid in the reconstruction of difficult passages.

At Australia's Sydney University, Department of Computer Science, Dr. Don Herbison-Evans has been working for the past ten years on ways of representing the human body in movement through time via computer. If his work succeeds, it will eventually be possible not only for dancers to learn new roles via the computers screen but for new choreographers to develop their ideas and skills at a terminal instead of tying up dozens of expensive trained bodies for months on end. Another potential use of a successful program would be to feed existing two-dimensional notation into the computer and see it performed instantaneously and in three dimensions on the screen. Inevitably, there are problems, the biggest of which is to develop a package that can be used by someone with absolutely no computer experience.

Within the actual program, one of the major difficulties has to do with velocity of movement. It is easy to interpolate between two positions with the computer and the speed of the movement can be made uniform so it accelerates or decelerates. Invariably in the next movement, however, the velocity will be different. When this is shown as a film, the eye picks it up immediately as a jerky movement. Overcoming this problem will require highly sophisticated programming.

Another problem is simply writing the software, an extremely labour intensive process. For this particular program, an Honours degree in Computer Science is required and even a good programmer can generate only ten lines a day.[371] A program of about 100,000 lines is required for a fairly decent system. Then there is the problem of errors because the trade average is one error per ten lines.

Although computer scientists in the United States prefer to work through Labanotation rather than Benesh, they too are encountering similar programming problems - primarily to find a way of reproducing the notation symbols with total accuracy on the screen, and secondly, to find a way of representing the human body in three dimensions.[372]

---

371. Sonia Humphrey, "Dancing Partners: Don Herbison-Evans and Sausage-women", Artforce, No. 45, Summer 1984, North Sydney, NSW 2060, p. 8.

372. Ibid., p. 8.

The development of a system is a multidisciplinary project involving dancers and computing scientists. Many other, more complex, problems can arise throughout the multiple phases of programming.

Since computers know nothing but what is programmed into them, the dancer must build a "library" of movements by programming the basic movements and combinations; e.g. walks, jumps, pliés, skips, battements, hops, prances, triplets, leaps, turns, et cetera - components of more complicated movements. To program a movement, the action must be broken down and an exact determination of timing and destination established for each body part involved in the motion. The information, written in a form the computer is programmed to understand, is typed in to the computer. Once the computer has accepted the data and it has successfully "run" (there is much room for errors in this entry process - clerical, procedural, or format), the information is then transferred over and displayed via a stick figure on a computer monitor. Obviously this is the climax moment - to see if the figure moves as was intended. Nine times out of ten it does not.[373] And the only way to correct it is to go back to the beginning.

Further problems can arise. The initial analysis of a movement to a suitable degree of accuracy presents difficulties. The computer must be given exact instructions of what to move and where, when and how to move it, since it has no kinetic sense of its own. With a plié this is not too hard, but the mechanics of a step, as in walking, are incredibly complex to describe. Then there are problems in how the computer actually displays the movement, problems which can only be dealt with by the computer specialist.

From the dancer's viewpoint, the main task is getting the figure to move naturally. The method of transferring the 'knowledge' is still cumbersome, and features need to be added, such as an instruction to put the foot on the floor or a restriction against it going through the floor, which will make programming the movements easier and more in keeping with physical realities.

Another modification being worked on by the Simon Fraser team is 'fleshing out' the figure to make it appear more natural. There is still but one figure possible in the program, so only solos can be 'performed'. The problems of more than one dancer are yet to be encountered in this system. Also, there is the matter of synchronizing sound, although this is probably a mere technicality. Similarly, lighting effects, props and other aspects of dance will need to be dealt with. Ultimately, when the system is developed as conceived, its only limitation should be in the notation itself.

Once developed, at least to a certain level of sophistication and portability, the new systems will mainly be used as a tool for the preparation, editing, and final printing of a score, for checking the

---

373. T.W. Calvert, J.A. Landis, and J. Chapmen, Notation of Dance with Computer Assistance, Department of Computing Science, Simon Fraser University, British Columbia, pp. 169-178.

accuracy of a notated score, and for viewing previously scored dances. Students might use the computer to help them learn notation, choreographers to visualize and create a dance without requiring dancers present, and dancers to view and learn a dance without the choreographer in attendance.

Computers provide an excellent storage system, useful for all types of dance data. Computerized dance notation is a potentially powerful, lucrative and creatively exciting information processing application that could be developed in Canada with the appropriate commitment of resources and energy. The "winner" in this race will be the system which puts the users - the choreographer and the dancer - at the centre of the development process and tailors the final product to meet their needs.

7.4 Computer-Generated Imagery

Computer art arrived unexpectedly, on the back of high technology, and is challenging long cherished notions of what art is all about. "Warpitout", a work by Chicago artist Jane Veeder, installed at the Ontario Science Centre in 1984 essentially uses the computer as an electronic portrait machine. The machine transforms a video image of the viewer's face into synthetic colors; then it offers a range of options by which the viewer can manipulate the result using buttons and a joystick, changing colors, creating a background and otherwise contributing to the creative process, with the final self-portrait recorded on Polaroid film.

"Hints of Flora", by Welsh-born Toronto artist Andrew Owens was shown during April 1984 on TV Ontario Telidon information terminals in public libraries in ten Southern Ontario cities. The artist designed 25 floral images which construct themselves on the screen and which can be called up one at a time, laid on top of each other and arranged however the viewer pleases.

Instead of framed objects hanging in art galleries, these are technological hands-on processes, indicative of the new directions being forged by computer art. They don't sit there asking to be looked at, they require participation and change the active-passive relationship between the artist and the public.

By exchanging palette and brush for keyboards and printouts, computer artists are gaining a quick way of seeing and changing their work in much the same way as musicians and composers. They have the choice of leaving it in the computer or transferring it on to rugs, videotape or lithographs. In the age of home computers, the possibility looms of an explosion of artistic talent.

Computer graphics were not, of course, designed for artists. They were meant to convert data into easily read charts for businesses, to handle complex mechanical drawings for architects and to create special effects for movies and television. They are used by the auto and space industries to simulate crashes in safety studies, and to plot designs of new machines in three-dimensional detail. In medicine, they depict internal body functions. Indeed, the major source of funding for graphics and animation in the United States often comes from the defence budget.

About the only programs developed with artists in mind have been those which introduce children to computers, and videotex, the two-way electronic publishing system, which sends text and illustrations via phone lines from one computer to another. But notwithstanding the limitations, North American artists are getting into the act. And they are doing so for many of the same reasons as business people: computer art is labour-saving, fast, versatile and portable.

The art is created in a variety of ways: by typing commands on a typewriter-style keyboard; by selecting letters for circles, lines, arcs, polygons and other shapes, then determining their size and position on the computer screen by using a cursor or a joystick; by drawing on a touch-sensitive pad known as a "graphics tablet", which automatically sends the drawings to the screen; by drawing directly on the screen with a special pen; or by video digitization.

Once on the screen, an image can be copied, reversed, squeezed, expanded, stretched or twisted. Colors can be changed, textured backdrops added, figures inserted or deleted.

Mixing electronic and traditional techniques has been explored more in the United States than in Canada. At CADRE '84, a conference in California's Silicon Valley that attracted 200 artists in January, many of the exhibits were computer art in the form of lithographs, serigraphs, cibachrome photographs, ceramic tiles and textiles. The transformations of computer art into other forms are done with photographs of the work taken off the screen, or from a computer printout. Conceivably, a buyer could commission the artist to transfer the piece on to anything from a wall mural to a T-shirt, and the artist could retain the original work to show and sell again.

In the Canadian field of computer imagery in art, two centers of activity that made early significant innovations, were the National Research Council - which developed both a computer music system and a computer animation system in the early 1970's, and the University of Toronto's Computer System Research Group which in the late 1960's initiated a visual artists and computer project from which graduate students have proceeded to employment in the United States with such noted institutes as Bell Labs, Xerox Park, Lucasfilm and the New York Institute of Technology.[374] The latter group also developed a computer music system for composers. The only funding they have received to date has been from the Ontario Arts Council in 1980-81; the success they have enjoyed has apparently resulted in increased demands on their production time.

Other Canadian centers include McGill University's Computer Vision and Graphics Lab, which concentrates less on graphics and more on the nature of vision and computer vision, the University of Waterloo's computer graphics program which is exploring animation and images, and the Laboratoire de

---

374. Catherine Richards, Preliminary Recommendations: Telidon, Computer Imagery and Visual Issues, paper produced for the Department of Communications, April 1981.

Télématique at the Université du Québec à Montréal which is exploring the artistic possibilities of both Telidon and standard computer imaging programs. Many small artist-run centres throughout the country are also purchasing microcomputers which are made freely available to their members for experimentation.

Canada's Telidon system for transmitting graphics allows the artist to determine the order in which the viewer will experience the work. Images can be built on top of one another or eliminated, resulting in a continually unfolding, multi-level collage. Little extras can be thrown in along the way, in the form of flashing images that disappear by the time the page is finished. The picture becomes a narrative.

One of Andrew Owens' images, entitled "There She Is, Miss America", starts out with two vertical rows of baby-blue U-shaped arcs; then the arcs disintegrate to show the silhouette of a beautiful woman on a windswept background made up of the remnants of the arcs. The entire work makes use of only two elements - the arc shape and the color blue - and yet the effect is satisfying. It took him three hours to devise.

Mr. Owens feels the emphasis placed on the computer aspect of his work is inappropriate, likening it to talking about "watercolor art". For him, "computer art doesn't have a lot to do with computers, the same way music doesn't have a lot to do with trombones. It is the player that calls the tune, rather than the instrument."[375]

Other artists disagree. For Anat Matri, a multi-media artist who arrived in Toronto from Israel in 1978, the medium is definitely part of her message. Yet her initial attitude toward computer art was skeptical. She thought it was all animated gimmickry, slick visuals untouched by human hands. As a reaction to the hype she heard about computers, she completed a sarcastic piece entitled "The Telidonna Lisa of 1984", for a one-woman show at "The Funnel" in Toronto. It was a blue-on-black abstraction, five feet square. When it was finished, she decided she wanted to exhibit it upside down, so she painstakingly copied the whole square in an inverted version, adding some minor variations.

It was then that she met Geoffrey Shea, a video artist and the founding director of Toronto Community Videotex, a non-profit centre that gives artists access to Telidon technology.[376] He told her she could have saved herself some trouble had she done her original drawing on a page-creator. She found she could easily transfer her drawing to a screen by

---

375. This information was gained by the author in telephone conversations with Mr. Owens during April 1985.

376. Toronto Community Videotex is a recipient of funding from the DOC's Special Program of Cultural Initiatives for upgrading existing videotex, page creation hardware and the purchase of new TELIDON page creator equipment and software. For more information: Toronto Community Videotex, 299 Queen Street West, Suite 501, Toronto, Ontario M5V 1A9.

use of a keyboard. To invert it she had only to type R-E-V for "revolve". She ended up including the Telidon version of the piece in the show, right next to her more traditional renderings, making use of the technology she had initially abused.

Anat Matri feels that computers have added to her options as an artist, and would like to lessen the alienation many people feel toward them: in many of her electronic "pages", geometric elements have squiggly lines and handwritten letters drawn over them, putting a human stamp on a process she sees as dominated in its commercial uses by glossy, antiseptic imagery. Her next installation piece uses two-dimensional cardboard cutouts of mummies, arranged in a circle and separated by subway-style computer messages. Like some other computer artists, she is mixing elements of ancient culture with modern technology.

The interactive aspect of computers is also highly appealing. Geoffrey Shea of Toronto Community Videotex is 25 years old and has had no artistic training. He makes pages of cartoon-style drawings and adds text, overlay sound and a storyline. He then lets the viewer choose which way a story will go by providing choices at checkpoints in the narrative. He has also experimented with making words appear and disappear on their own, to illustrate the progression of an idea, using size, color and positioning for extra effect. He calls this "plastic poetry".

Some artists are not keen on "applying eighteenth century notions of what art is to a brand new tool",[377] and see nothing in the imagery produced by computer artists that was not done better by hand 50 years ago. Others don't see why artists can't go as far with computers as they have with oils, if only because feeding the computer incorrect commands creates accidents that can spur new ideas.

Every aesthetic medium used for individual expression has its own inherent capabilities and unique physical characteristics. An artist choosing the medium of computer graphics is required to develop a sensitivity to, and an awareness of, these qualities. It goes without saying that those who intend to produce the finest imagery in any medium must possess a profound knowledge of the complete range of capabilities of that medium. Computer image makers should be no different.

In an attempt to put the process of generating computer aesthetics in perspective, several observations should be made. From its beginnings, around 1965, the actual production of any form of computer-aided image was complicated by at least three obstacles: 1) images had to be programmed in complex higher order languages on complex graphics hardware, 2) turn-around time was excessive, and 3) access to the equipment was extremely limited. The process of creating aesthetic works on the computer was similar to playing a piano and having to wait several hours or more to hear the

---

377. Derek Dowden, Coordinator of the Artculture Resource Centre, cited in Mitch Moldofsky, "Computer Chiaroscuro", The Globe and Mail, April 12, 1984, p. 15.

resultant sounds.[378] Both the hardware and complicated programming of graphics peripherals severely inhibited the role of using the computer as an aesthetic medium.

Still, computers offer artists promise on two levels: as tools, that like a compass or straightedge, facilitate and extend the capacities of the hand and as an extension of the brain, making possible, even at the most humble technological level, the completion of complex procedures that would not otherwise be undertaken, if only from considerations of the time available in an artist's lifetime. The machine does not replace the hand, it merely modifies the aesthetic process with technology. The machine alone is not capable of producing aesthetic imagery (except by accident or chance) but must be directed by the mind and programmed via the hand. The machine, or more specifically the technology represented thereby, provides another dimension to the hands' capabilities. Thus, any production of a visual statement involves a process whereby the mind must be able to think in terms of the medium in conjunction with sufficient craftsmanship and expertise to produce the appropriate aesthetic image.

It is appropriate to mention some of the attributes and applications of computer enhanced media because the media possess their own capabilities and characteristics. For example, plotter-drawn lines exhibit a unique quality and are different from lines drawn by hand. The imagery has characteristics determined by the hardware: it is extremely accurate. Computer imagery can take advantage of repeatability (loops) to facilitate infinite variations or similarities within a single image or between images. By the same token, randomness can be employed to make trivial decisions or produce controlled variations. These and other characteristics give a unique feeling to computer aesthetic imagery.[379]

The limitations of using computers for aesthetic applications may have kept many artists from exploring computer enhanced media. However, few computer artists have access to the kind of computer equipment with sufficient power and memory to produce sophisticated imagery capable of meeting their highly refined aesthetic standards.[380] One artist, Johanne Daoust, used her company's $50,000 Tech Graphics 1 system to create slides for incorporation into an animated film. As opposed to Telidon's seven colors, she has a

---

378. John Whitney Sr. made this analogy in an early film he produced entitled "Experiments in Motion Graphics", cited in William J. Kolomyjec, "Thoughts on computer aesthetics and the future role of small computers", Proceedings, Symposium on Small Computers in the Arts, November 20-22, 1981, Philadelphia, Pennsylvania, IEEE, January 1981.

379. William J. Kolomyjec, "Thoughts on computer aesthetics and the future role of small computers", Proceedings, Symposium on Small Computers in the Arts, November 20-22, 1981, Philadelphia, Pennsylvania, IEEE, January 1981.

380. Mitch Moldofsky, "Computer Chiaroscuro", The Globe and Mail, April 12, 1984, p. 15.

choice of 256 shades displayable at one time, from a bank of 16.7 million. (The new North American standard for Telidon carries 16 colors from a bank of 4,096.)

To a certain extent the problems which existed in the beginning, namely the mathematics and logic requirements associated with computing, slow turn-around time and limited access, still prevail. Large computer facilities are perceived to have stymied the artist, since most facilities with sophisticated graphics production capabilities are owned by industries, governments or educational institutions, and access to hardware is controlled.[381] Once access is obtained, the question of cost must be reckoned with, usually by direct or indirect billing procedures. Finally, because of a lack of graphics standards and device-dependent instructions, even though a person may have programming expertise, the generation of graphics output is installation-specific. Even if graph primitives are available, rudimentary graphics algorithms, for example, "draw circles" or "rotation of all or part of an image", are not obvious or available without proper instruction, as in the example of Anat Matri, mentioned earlier.

It would appear then, that just as for music, the microcomputer represents the bright light on the horizon for computer aesthetics. Aside from the current wide application of personal or home computers for accounting, text editing and game playing, microcomputers with graphics capabilities will likely play an increasingly major role in promoting computer aesthetics in the future. Of course, microcomputers are still limited in their inability to render an unlimited variety of colours and the micro's low screen resolution also inhibits an accurate rendition of complex pictures as well as the display of detailed and photographically realistic images. But programs in computer languages for the display of complex pictures are now available for large computers and it is expected that similar programs will soon become available for personal computers too.[382]

The low cost of micros and their ability to generate and manipulate patterns quickly and interactively makes them accessible and desirable for independent artists. The small computer is essentially a teaching tool representing a bridge between science, technology and art that is making it possible to explore aesthetics in the artist's studio and to eliminate the requirement for access to large expensive mainframes.

Both the Canada Council's Integrated Media Program and the Ontario Arts Council offer grants to encourage experimentation with computer graphics. In May 1984, computer art was featured at Ontario Place's Future Pod as part of an Information Garden exhibit organized by the Artculture Resource

---

381. William J. Kolomyjec, "Thoughts on Computer Aesthetics and the Future Role of Small Computers", Proceedings, Symposium on Small Computers in the Arts, November 20-22, 1981, Philadelphia, Pennsylvania, IEEE, January 1981.

382. Hans Joachim Andree, "Graphics and Animation by Personal Computer", Leonardo, Vol. 15, No. 1, 1982, pp. 34-36.

Center and the Communal Art and Technology Gallery. From July 1 to October 8, 1984 the Ontario Science Centre celebrated computers and the arts in the show, "The Artist as a Young Machine".

Also to encourage and assist artists in all disciplines who are attempting to bridge the gap between art and science in their work, the Canada Council in conjunction with the National Museum of Science and Technology in Ottawa began sponsoring an artists-in-residence program at the museum in January 1985. The objective of the program is to enable artists working with concepts and processes conventionally associated with science and engineering to further their investigations and create new works. Also, the program is intended to highlight the observations of artists addressing the bonds between art and science, in the context of a world-class museum of science and technology. This integration of works of art into exhibitions and programs is a means of widening the perspective of science and technology among Museum visitors.

To develop and produce of works of art and creative exhibits, participating artists have access to all Museum facilities - which include fully equipped shops for graphic design, woodworking, metalworking and machining, painting, welding, and electronics - and to the highly skilled and knowledgeable staff.

Also available are a theatre, with film and video projection systems, a video and audio studio, a major computer centre and an amateur radio station suitable for world-wide communications in shortwave. Successful applicants to the program effectively have an audience of approximately 600,000 Museum visitors every year.

The staff of the Canada Council and the National Museum of Science and Technology collaborate in the assessment and selection of proposed works which are relevant to the Museum's objectives and challenging as contemporary art. An advisory panel composed of artists and knowledgeable persons familiar with the cultural interaction of art and science assist in the selection. Financial assistance to artists consists of support for travel, the costs of residency, and artist's fees. Funds for materials and rental or purchase of equipment are also available.

More than thirty artists submitted proposals for participation in the first competition of the program and four artists were selected to participate.[383]

---

383. Max Dean, a sculptor from Ottawa, researched and developed a prototype for an 'intelligent', active, sculptural environment.
Blake Fitzpatrick, a photographer from Toronto, conducted a photographic investigation of the Museum itself, researching and collecting images of the Museum, including the workshop areas and the displays.
François Giroux, a composer and performer of computer assisted music from Montreal, composed an original video work entitled "Biohazard" to complement his 'science music' score of the same title.
Rick Raxlen, a film and video artist from Montreal, composed and assembled a multi-monitor video installation, utilizing computer image-processing to expand the visual possibilities of his video essay on contemporary locomotive technology.

7.5 Holography

Holography is a rapidly developing technology through which pictorial information is recorded on photographic film by means of the interaction of highly organized light waves or an interference pattern emitted from a laser. Despite its unique properties, holography has never really been part of the vocabulary of popular high technology. Invented in 1947 by Nobel Laureate Dr. Dennis Gabor, a Hungarian electrical engineer who stumbled on this use of laser photography while trying to improve the electron microscope, it is a process that creates three-dimensional images with apparent applications ranging from visual display to biomedical engineering.

Applications of holographic science increased rapidly with notable developments in optics, communications, data storage, and engineering. Holography has been utilized for a variety of engineering applications such as optical non-destructive testing. Other applications of holography include digital data storage, optical displays, pattern and character recognition, image processing, spectroscopy and photogrammetry. Many of these applications have been developed in the last ten to fifteen years, the most notable among these being display holography. The breakthrough in producing inexpensive holographic replicas has brought holograms within the reach of the general public.

A hologram is always manufactured by using monochromatic (one colour) light from a laser, and it is usually replayed with laser light, too. While a white light source (e.g. a light bulb) is much cheaper and more accessible than lasers, the problem with using white light stems from the fact that is is composed of a wide range of colours. When the hologram is replayed in white light, each colour gives a different image, shifted from all the others. The overall effect is a slightly blurred image. However, there exist more sophisticated approaches. Holograms can be reconstructed with a built-in colour filter which results in a white-light reflection hologram. They are produced in laser light in such a way that a colour filter (spectral filter) is created in the bulk of the photographic emulsion.

When the hologram is viewed in white light this filter selects only one colour so that a sharp image is produced. Alternatively, white light holographic replay is achieved by what are called white light transmission or rainbow holograms. The image from a hologram looks different from every different direction of viewing. Also the left and the right eyes see a different perspective, producing the perception of depth or "parallax". For a human observer the horizontal parallax is more important than the vertical, thus the non-essential vertical parallax of the hologram can be replaced by features that permit replay in white light. When the observer moves his eyes vertically, the image appears sharply in bright rainbow colours.

Artistic interest in the technology began to develop in the mid 1960s, and has continued to grow since then. During the 1970s its use was restricted almost entirely to artists who were quick to realize its aesthetic possibilities. This has all changed in the past few years, and now 80 per cent of holography is commercial. Lately there has been a considerable

amount of activity in the area of white light holograms. This has mainly been due to their increasing popularity as visual displays among artists and advertising people. Holograms of objects of art are even being used in place of the real things as exhibits in museums. In addition, artists are using holography to preserve and display their creations.

The art of holography has been explored by a small handful of artists working independently in private studios around the world. In the mid-1970s, the artistic holographic community began to form around the New York Museum of Holography. Holograms have many unique properties, including three dimensionality, ability to replicate reflectivity and transparency, and glowing colour. Within the limits of the technology, artists have been able to explore and express a wide range of personal imagery.

Still, holography continues to be regarded as a new art form by the public - new, that is, when compared with much more widely used media of modern times such as photography, film, and video. Canadian artists began experimenting with holographic techniques about fifteen years ago. In the early 1970s Al Razutis in Vancouver set up Visual Alchemy, a studio where it was possible for artists to produce holograms, and David Hlynsky and Michael Sowdon established Fringe Research Holographics Inc. for the same purpose in Toronto. Fringe Research is the only Canadian site offering beginners courses in holography. Another fledgling operation under the umbrella of Fringe Research is the Interference Hologram Gallery (which opened in October 1983 and derives its name from the holographic interference pattern of laser-emitted light waves on photographic film). This Gallery "deals with the aesthetics of holography more than the technical aspects"[384] which are left to Fringe Research. It was these initiatives that enabled Canadians to be involved in the development of holography as a means of artistic expression at a time when similar experiments with this new medium were going on in the USA, Britain and elsewhere. The development of holography in Canada has been slow as the number of production facilities has always been limited and the costs incurred in the initial setting up of a holographic studio are prohibitive. As a result of the pioneering efforts of those first Canadian studios, there is a growing number of artists with a long standing interest in holography and a high level of technical expertise.

Interest in holograms produced by artists is spreading throughout the world, fostered by an upsurge in major museum exhibitions of the medium, the establishment of more galleries that deal exclusively in art holography and the rising numbers of "public access" laboratories.

In recent years, exhibitions in Britain such as Light Years Ahead at the Photographers Gallery in 1980 and Light Dimensions, shown both at the National Centre of Photography in Bath and the Science Museum in London, have included work by Canadians. It was, however, not until the collaboration in 1984 between the Light Fantastic Gallery in Covent Garden,

---

384. Sydney Dinsmore, Director of the Interference Hologram Gallery, cited in Christopher Hume, "New gallery gives holography added dimension in Toronto", Toronto Star, January 15, 1985.

London and Toronto's Fringe Research that a sizeable body of work from Canada was sent to Europe. This exhibition called "Canadian Holography Now" was seen in London at Canada House (Trafalgar Square), in Edinburgh and at several other galleries around Europe which specialized in holographic work.

The exhibition included thirty holographic works by twelve Canadian artists most of whom participated in Artist-in-Residence programs in 1982 and 1984 at Fringe Research. With some exceptions, all of the holograms in the exhibition were executed under the auspices of the Artist-in-Residence programs, the intent of which was twofold: to provide the technical means for an inexperienced artist to execute a holographic idea and to give them an opportunity to work in conjunction with experienced holographers on technically advanced works.

That the exhibit was well received is provided by the testimony of two British journals. In the section called "Galleries Briefing", the Guardian wrote:

> Canadian Holography Now (Canada House. Trafalgar Square, until August 28). If anybody is going to rescue holography from its sad fate as an unwanted art gimmick it is surely the Canadians. With substantial state support allied to a natural propensity for new art technologies, the Canadians have already made important progress, as this intriguing show proves.[385]

The Telegraph article stated:

> The art of holography has much of the appeal of magic. It is something at which the Canadians are particularly good, as is at the moment evident at Canada House, Trafalgar Square.
>
> There, until August 28, the exhibition "Canadian Holography Now" excites that part of us all that loves to turn to magic. There is a contradiction here, for, although the effects achieved by holography may appear mysterious to the layman, they are in reality very much a matter of science.
>
> This is one reason why it is not surprising that Canadians have achieved so much with this relatively new art. The teaching of science has always been particularly good in their schools; and Canadians also know how to play, and play hard, and here is another aspect of holography.
>
> It is the science of projecting upon a flat surface images which appear to be three-dimensional... Yet this should not blind us to holography's claims to be an art, claims which, as the Canadians prove are legitimate.[386]

---

385. "Galleries Briefing", The Guardian, London, July 24, 1984, p. 9.

386. Terrence Mullaly, "Art/Canada's new dimension", Telegraph, London, August 1, 1984.

The Toronto Globe and Mail also reported:

> In addition to being an excellent brief introduction to the young and exotic art of holography, this display is rich in subtly intelligent and bold art-objects... Happily absent are boring scientific demonstrations and glitzy gimmicks by artists made slap-happy by the slick beauty of the medium, all of which were signs that Canadian holography was still having lots of growing pains. What has been needed for some time is evidence that artists can successfully and credibly get holography out of the lab and into the ongoing, historic discourse of art. This little show is certainly a big step in that long, important process of liberation.[387]

During the early days of holography artists wanting to use the process worked in relative isolation. There were few involved, no forum for discussion or places to learn the techniques outside of optics and physics degree courses. As materials, equipment and techniques became more accessible, so groups of interested parties banded together to teach holography in independent 'schools'. Since then schools and facilities have spread, centres of information have grown and artist-in-residence programmes or collaborations with research facilities have expanded the accessibility of the medium. Some artists have their own facilities and work is being increasingly shown at exhibitions in many countries.

As more new work continues to be produced by a variety of people with different aims and backgrounds, and that work percolates through the system into galleries, it will become harder to dismiss it on grounds of novelty alone. Display holography has clearly found its way into the advertising, promotion and publishing worlds. As its familiarity increases and the novelty decreases some artists will likely move to new directions again. Others will continue doing what they have been doing all along - making succinct visual statements and associations.[388]

7.6 Yes, But Is It Really Art?

"Yes, but is it art?" is the question that must give all people who call themselves artists insomnia. It's a question but also a kind of judgement on something that veers from the already seen. It seems to become more difficult every year to clarify what art is and isn't but, still, most people tend to cling to some concept or other such as "art is a conceptual image with implicit communicative intent" or "art is the artist's interpretation of a general reality or experience". Viewed in terms of an

---

387. John Bentley Mays, "Entertainment", The Globe and Mail, Toronto, January 10, 1985.

388. Andrew Pepper, Canadian Holography Now, Canada House Cultural Gallery, London, July 1984, p. 4.

investment or sales commodity, the art world has always had some borderline media which people are unsure how to classify. At present, computer art and holography may fall into this category.[389]

Computer art imagery is hardly ever seen in a museum or art gallery but is almost exclusively contained on the pages of computer trade magazines. Holography has been used by some quite creative people to represent seemingly three-dimensional mobile images of people or shapes, but most people think of the medium in terms of supermarket scanners or medical stress testing, and few know where to see examples of its artistic application.[390]

There may be 300 or so people in the world involved to some degree in holography though few artists use it as their primary medium (Salvador Dali, for example, made holograms in the early 1970's) and many others are laser researchers experimenting with the medium in more creative ways.

Despite the existence of museums in New York and Toronto and occasional exhibits, holography continues to strike the few people who have heard of it as more of a novelty than an art form as serious as the more traditional ones found in art galleries and museums.[391]

Most offbeat media that enter the mainstream art world do so either on the strength of a noted artist making it - for instance, Picasso and collage - or by a sizeable number of artists involved in it, as in the case of fiber art. Photography and graffiti art have become part of museum collections although they had in the past been viewed as, respectively, mere craft and urban blight. Rubber stamp art, however for which there was a passing fancy among some artists in the late 1970s, seems to have died out.

The new borderline media is distinguished by its reliance on technology that may well be outdated within a few years and by its relative inexpensiveness. Many dealers, while intrigued with the images see no real sales value in works that are easily reproduced either by punching in data or photocopying.

There are occasional opportunities to view computer images in an "art" setting[392] but because of the highly technical nature of computer

---

389. Daniel Grant, "Art on the Borderline", Art & Artists, 1984, p. 13.

390. Daniel Grant, p. 13.

391. Daniel Grant, p. 13.

392. Stewart, Talvori and Chang recently published a coffee table book of figurative and abstract computer designs, Computer Images, at $16.95; see also Melvin Prueitt, Art and the Computer, McGraw-Hill Book Company, U.S.A., 1984.

programming, relatively few artists have the skills to work in this medium. Many of the creators of computer art are "technicians dabbling in graphics",[393] and what they produce is a lot of highly simplified geometric shapes. It is very hard to develop a personal style on a computer. The machine puts up a lot of resistance to anything that is out of the ordinary. It's hard to push away from the machine's look, a fact that can be very frustrating for really good artists.

Based, as it is, on sophisticated machinery, computer art, holography, or any of the other forms which new technology has helped to create may become obsolete when yet more advanced technology is devised. Collectors of these media must also be aware that these works may never receive recognition as serious forms of art.

Risk-taking is as much a part of buying art as making it. In a market sense, it is the purchase of works, or a recognition of their potential saleability, that is the primary factor in raising non-functional, possibly decorative objects into the realms of art. An artist's say-so is no guarantee of value and, because of this, collectors of contemporary art are not just passive dispensers of money but become (sometimes without their knowing or wanting it) proponents of a whole new concept of art.

---

393. Daniel Grant, "Art on the Borderline", Art & Artists, 1984, p. 13.