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COMMUNICATIONS TECHNOLOGY IN CANADIAN HEALTH CARE

THREE CASE STUDIES

by

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B.A., University of Montreal, 1967

M.A., Concordia University, 1976

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF

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ABSTRACT

The thesis examines the evaluation of Canadian telemedicine projects and experiments, defined as the application of communications systems to support health care activities. Evaluation procedures, used to determine the value of programs, projects or experiments, are studied in association with methods to assess user needs prior to implementing such projects.

Three studies were conducted. The first is historical. Using a form of meta-evaluation, all the Canadian telemedicine experiments that used satellites as a communications link were reassessed. The second study consists of a type of needs assessment which involved site visits, observations, surveys of documentation, and forty interviews with health association professionals who were asked to assess the need for a health communications network. In the third study, ninety-eight interviews were conducted with health and medical professionals who have access to an educational network, to determine if network services were needed to deliver health information.

The first study found evaluations of satellite telemedicine projects did not account for context, were not focussed on users, and were inadequate to capture all the effects. In most cases, needs assessments had not been done. The second study showed surveying users regarding their needs for communications services did not produce the information required to implement an appropriate health network. In the third study, an assessment approach based upon the concept of grounded theory was developed

and tested, using a computer program to categorize narrative data in terms of themes raised by the interviewees. The new approach permits consideration of context, user needs, and a wide range of effects for all phases of a project's life span, from needs assessment to final evaluation.

The implications of the three studies are assessed and recommendations are made for further research, building on the findings of the entire study.

Contributions made by this thesis include the description of a new approach to needs and program assessment, and the development of a computer program which assists in the categorization of narrative data as themes. The approach can be used as a basis for systematic analysis and permits data organized under the thematic headings to be accessed directly by stakeholders.

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A. Chapter One: Introduction and Background

I. Part One: Introduction

The Study

This study is concerned with the introduction and evaluation of telecommunications technology in health care. Three case studies are contained within this overall study. The first is historical. It consists of a review of the Canadian telemedicine or telehealth experiments and pilots that used a satellite as the principal communications link. The second and third cases are contemporary. Through a series of interviews, observations and documentary research, these two contemporary case studies document an exploration of the 'need' for telecommunications technology in health care, in two different health care sector contexts.

The purpose of this study is to provide a critical examination of the historical telemedicine experiments, with particular emphasis on the evaluations of these projects. The result of this critical assessment, taken together with the information gathered in the two contemporary studies, provides the background necessary to the development of a new approach to the introduction and assessment of communications technology in the health care field.

Some Basic Definitions

The most widely used term to describe the use of telecommunications for medicine and health is 'telemedicine'. This term has been defined variously as use of two-way or interactive television to conduct transactions in the field of health care (Park 1974), or as the use of telecommunications technology to assist in the delivery of health care (Conrath, Dunn, and Higgins, 1983), or simply as health care delivery to a remote site through the use of communication links (Brown 1982).

For purposes of this study a broad view of telecommunications in health care is taken, to include telemedicine activities which are related to delivery of medically-related information and care to remote areas, to the provision of educational and administrative services in health care, using a combination of telecommunication links. To describe these activities, telehealth is a term which is gradually superceding telemedicine because of increasing use of telecommunications systems in health care for educational and administrative purposes, as well as diagnostic or therapeutic reasons. A recent study on the subject used this term to mean "the application of any telecommunication medium in the support of the full range of health care activities such as medicine, dentistry, nursing or other health professions." [1]

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[1] Woods Gordon, Uses of Telecommunications within the Health Care System , Report to the Department of Communications (Ottawa: Dept. of Communications, 1984), p. 1.

The terms telehealth and telemedicine are often used interchangeably, but for purposes of this study, the term telemedicine is used in a historical context, in association with the first study, which is historical. The term telehealth, or alternatively, the phrase telecommunications in health care, is used in the contemporary contexts.

The telecommunications technologies used most frequently in the implementation of telemedicine or telehealth projects and systems include both those technologies which link (telephone lines, cable, microwave and satellites) and the associated terminal technologies, ranging from television monitors to those terminal devices which receive computer data or display telemetry-type information such as EEG and ECG tracings or fixed images such as the slow scan images which can be transmitted using the narrowband range. Except where specified, the simple telephone system is not excluded from consideration, although, in most cases, far more elaborate technology is involved.

This study however, is about the introduction or the evaluation of new communications systems not previously available to the sites under study. This new technology aspect involves at least the following elements: (1) a new way to transmit and/or receive medical or health information; (2) end users who receive and/or transmit the information; and (3) some communications technology system, which is either innovative or new to the health care context under study.

The term network is also frequently used in this study, particularly in relation to the contemporary studies found in Chapter Five. In this context, network is defined broadly as an interconnected set of dependant or independant terminals, points or nodes, carrying data in analogue or digital form, accessing one or more sources of information and using one or more communications channels and modes.

In the context of this study, the term 'evaluation' is used in its broadest sense, that is, as any form of assessment which is intended to fix the value of or determine the worth, relevance or significance, of a program, pilot project or experiment. Although many definitions are provided, the terms evaluation and program evaluation have been used interchangeably, because a program is often a convenient unit or entity which can be investigated. Essentially, the techniques used for evaluating experiments and programs are the same, and their selection depends as much on the orientation of the evaluator, as on the nature of the program being evaluated.

Many types of research activities can be subsumed under the general term program evaluation. A literature search of program evaluation references conducted for this study shows this phrase is used broadly to encompass research activities, methods, and techniques borrowed from a range of fields. Although the term program evaluation is used throughout this study, the phrase emerges most frequently in the course of the first study which consists of a reexamination of the reported evaluations of

experiments and pilot projects.

Through a reassessment of previous evaluations in the first study, and through information gathered in two contemporary case studies, a new approach to examining the role of communications in health care is developed. The term approach is used here in a more global sense than technique, method or model. It is used in a sense already suggested for program evaluation by authors Guba and Lincoln [2] and it encompasses a method for documenting and analyzing data obtained through interviews, observations, and documentary research conducted before, during and after a project's lifespan.

The term approach is suggestive both of perspective and of method. It was adopted in this study, as a suitable term to encompass both the theoretical perspective and the instrumentation used in the contemporary case studies. The approach formulated uses a theoretical perspective provided by grounded theory, a perspective which has been used in several fields, including medical sociology research. The approach recommended is partially tested in the third and last study, where interview data were collected and later placed in categories called themes, which were created using a computerized text processing program. The themes reflect issues and concerns as well as needs.

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[2] Egon G. Guba and Yvonna S. Lincoln, Effective Evaluation (San Francisco: Jossey-Bass Publications, 1981).

For purposes of this study, needs are defined as the gaps or discrepancies between a desired condition and the current situation or status quo. (Kimpston and Stockton 1979). The approach formulated in this study was used for a survey of needs or a needs assessment, generally defined as a process for identifying and measuring these gaps or discrepancies. Several authors link the concepts and procedures used for needs assessment, design, planning, implementation and evaluation. (Trimby 1979).

The approach developed and tested in the third case study can be used for a number of such project phases, from needs assessment to evaluation. As formulated, the approach provides for a consideration of the context surrounding a program, project, or experiment. It allows for user input at every step of the procedure. [3] It can be used to account for emerging and unplanned-for effects through a flexible procedure for ongoing collection of data. The approach recommended is process-oriented, and, by its very nature, departs from the pre- and post-measurement paradigm which is characteristic of most program evaluation methodology.

The theoretical perspective underlying the approach developed in this study permitted the application of a

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[3] In this context, the user is defined as a frontline health care worker, professional or provider. Typically, the user is a nurse, doctor or technologist but could also be a receptionist, a patient or an administrator. In some systems, the general public could be end users, for end users receive and use the information for decisionmaking, diagnoses, treatment, training or other use.

relatively simple method for organizing large amounts of narrative information. Applying or developing this method was not the principal objective of the study, but it became possible to apply it in the final study. Although the perspective seems ideally suited to case study research, and the technique developed applicable to a variety of research situations, including program evaluation, it is emphasized that no one methodology is applicable to evaluation or case study research in the complex, broad, multidimensional context of health care. This is particularly the case when innovative or complex technology– such as telecommunications systems– is introduced in this context. Many problems surface and need to be examined when communications technology is introduced in any complex organization. The component parts of the health care system provide examples of such complex organizations.

The term context is used frequently in this study. Not a simple term to define, it generally refers to all the attendant circumstances and conditions in an environment which influence meaning.

The overall study embodies three sub-studies, which have been termed "case studies". For purposes of this discussion, a case is any bounded system, and Robert Stake's definition (as described in the section on Methodologies, which follows) best describes, in simple terms, how the phrase case study is used in

this thesis. [4]

Overview of the Chapter

This first chapter is organized to present some background information as well as to introduce the study through a bird's eye view of the entire dissertation. Following this introduction, a second section outlines the macro-level perspectives of the study through abridged descriptions of four background contexts:

1. health care in Canada,
2. the federal Department of Communications (DOC) and its role in introducing telecommunications in health care,
3. the history of telecommunications for delivery of health care information,
4. the broad context of evaluation.

Following this, a third section will be devoted to the purpose, focus and methodologies of the study, with a description of the framework used. What emerges in this section is that this study is an example of multiple methodologies. The fourth section of the chapter outlines the limitations, the assumptions and the significance of the study. A fifth and final section provides a map of the entire study's plan, chapter by chapter.

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[4] Robert E. Stake, "The Case Study Method in Social Inquiry," Educational Researcher 7 (1978): 5-8.

II. Part Two: Four Background Contexts

Health Care in Canada

In the broadest picture of health care, a definition of what is meant by health needs to be established. The World Health Organization's oft-quoted definition of health as "...a state of complete physical, mental and social well-being and not merely the absence of disease or disability" [5] has been much criticized, for it embodies an underlying assumption that a complete state of health exists, can be determined, fostered and maintained, and that health is clearly distinguishable from another state, that of illness or disease. Interdisciplinary and cross-cultural comparisons have cast some doubt on the basic distinctions between health and illness.

"Good health has two main aspects: length of life and its quality." [6] Estimating quality of life, and drawing the line between life and death (which has recently given rise to the need for a new definition of clinical death) are but two examples of problem areas when one examines the appropriate

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[5] Anne Crichton, Health Policy Making: Fundamental Issues in the United States, Canada, Great Britain, Australia (Ann Arbor, MI: Health Administration Press, 1981), p. 3

[6] R. Wilkins, Health Status in Canada 1926-1976 (Montreal: Institute for Research on Public Policy, 1980), p 4.

measures for promoting health and treating illness. There are also many definitions of illness, and lay persons define illness differently from health professionals, for instance.

A simple definition of a health care system might be "the quantity, quality, arrangement, nature and relationships of people and resources in the provision of health care. It includes medical practice, nursing, hospitals, nursing homes, medical drugs, public and community health care services, ambulances, dental treatment, and other health services. . . [7] Medical care still forms a significant portion of the services offered through any health care system. Medicine is defined as the science and art of "dealing with the maintenance of health and the prevention, alleviation, or cure of disease." [8] Therefore a health care system embodies more than those activities associated with care provision, for those functions related to health promotion and disease prevention, to administration and education must also be included. A very large number encompassing a range of agencies, activities and persons make up a health care community.

In the landmark federal white paper A New Perspective on the Health of Canadians , tabled in the House of Commons in April 1974 by the Honorable Marc Lalonde, then Minister of Health, the phrase health care system was replaced by health

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[7] Government of Canada, Department of National Health and Welfare, A New Perspective on the Health of Canadians, the Lalonde Report (Ottawa: Information Canada, 1974), p. 32.

[8] Webster's New Collegiate Dictionary, 1979.

field. The field is subdivided into four broad elements which are: human biology, environment, life-style and health care organization. The case studies selected for the present study of telecommunications in health care are all taken from the health care organization category. However, the other categories are included in the discussion because considerable overlap exists. Indeed, Crichton has suggested that it is very difficult to separate the health care system from the entire social system in any country.

In a recent survey of the Canadian health care system, conducted for the Canadian federal Department of Communications, the authors found that describing the Canadian health care system was "a major undertaking." [9] Their review-description subdivided the system into four subcategories, one each for health education, health care delivery, administration, and social aspects.

In a report written by the author of this study for the Knowledge Network, [10] the health care system was described as a community divided into two large categories, recipients and providers. The recipients represent the largest class because they include all patients or clients of the system and, as well, any member of the general public who may require or has obtained care services.

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[9] Woods Gordon, Uses of Telecommunications Within the Health Care System , p. 8.

[10] A portion of this report is provided as background reference. See Appendix A.

The providers, on the other hand, can be divided into three large overlapping subcategories: those who dispense care (health manpower), those who administer the funding and management of health care, and those who are involved in research and in the theoretical and clinical education of health care professionals. Included in the provider category are all levels of government involved in public health and health care, nationally, provincially, and municipally, even those departments whose primary function relates to health prevention and promotion rather than the direct provision of health care services. Finally, this category necessarily includes all the institutions through which health care and health education are dispensed, as well as all the licensing bodies and health related professional associations. Many persons in this large category are representatives of all of these subcategories, that is, they are administrators, health care providers, and members of their respective institutions and professional associations.

In Canada, the primary responsibility for health services falls under the jurisdiction of provincial governments, because of the two joint tax-supported insurance programs. The first of these, a joint tax-supported hospital insurance program, was first introduced in 1958. It provides hospital ward care and diagnostic services, is under provincial administration, and is, for the most part, compulsory. The medical insurance program was introduced in 1969. Costs are shared equally from federal and provincial revenue sources. Over the years, federal-provincial

conflicts have arisen over the means of financing and providing health care, culminating periodically in open conflicts between various political interest groups at provincial and federal levels and between governments and professional interest groups, particularly the medical profession. Several important reviews have found overwhelming support for the present system, although "the medical professional has expressed great dissatisfaction because the system effectively controls. . . their incomes." [11] The most recent controversy and conflict over the introduction of the Health Care Act, which would outlaw extra-billing and thus contain and control professional and institutional revenues , stands as a current example of the conflict which remains because the state operated health care system is still "dominated by professionals" who have an "ambiguous role as private businessmen on the public payroll." [12]

In addition to financing ambiguities, equal access is also an ideal which is difficult to realize considering Canada's geography, its regional differences, and the fact that the health care system is an agglomerate of ten provincial, two territorial, and one federal health care structure, "which have evolved from a combination of random growth, local initiative,

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[11] Robert G. Evans, "Health Care in Canada: Patterns of Funding and Regulation," Journal of Health Politics, Policy and Law 8(Spring 1983): pp. 1-43.

[12] R.G. Evans and M.F. Williamson, Extending Canadian Health Insurance: Options for Pharmacare and Denticare, Ontario Economic Council Research Series (Toronto: University of Toronto Press, 1979), p. 4.

central planning and political compromises." [13] Yet, a commitment to equality of access is expressed through the provision of health care services through the state insurance plans. This commitment, despite geography and climate, has sometimes been used as a rationale for the implementation of telecommunications services, to link remote communities of the north to sophisticated urban centres in the south, for example.

In Canada, health care costs now average over thirty billion dollars annually [14] but we do not know how well this compares with other countries, because no comparative data are available for measuring the inputs to a health care system. [15] As well, there are a number of difficulties in assessing the effectiveness of a health care delivery system, including the fact that the output of the health care system has "elusive quantitative, qualitative and price dimensions." [16]

Stated goals which the system embodies sometimes conflict. For instance, a large part of a health care system is geared to provide medicalization to treat illnesses. This is occasionally in opposition to the measures which are required for the

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[13] Government of Canada, Science Council of Canada, Science for Health Services, Report of the Science Council of Canada, no. 22, 1974, p. 19.

[14] Government of Canada, Health and Welfare Canada, Health Care Expenditures in Canada 1976-83.

[15] Brian Abel-Smith, Value for Money in Health Services (London: Heinemann, 1976.

[16] Government of Canada, Economic Council of Canada, Seventh Annual Review of the Economic Council of Canada, 1970.

promotion of health. According to some authors, [17] the medical paradigm, variously defined as an ensemble of measures to treat illnesses, appears to have had a deleterious effect on health.

Because of these ambiguities in definition and operation it is no simple task to choose those programs or procedures which have an assured positive impact on health and disease. The introduction of telecommunications technology in the health care sector is no exception. It has not yet proven to be of clear benefit— partly because very little is known about the drawbacks and benefits of the technologies, and partly because the past experiments or projects were rarely matched to an overall plan for improvement of health care. Moreover, much like telecommunications can extend the classroom in distance education, telehealth extends the system of health care as currently organized. The health care system is not without its flaws and any extension of it carries the seeds of the same inefficiencies, ambiguities, problems and conflicts mentioned above.

These ambiguities and problems are complicated further when one considers the role of government at several levels. In Canada, municipal, provincial, and federal governments all bear overlapping responsibilities for various aspects of the health care delivery system.

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[17] Luciano Bozzini, Marc Renaud, Dominic Gaucher, and Jaime Llambias-Wolff, eds. Medecine et societe: les annees 80 (Montreal: Editions cooperatives Saint-Martin, 1981), pp. 31-51.

Taylor provides an excellent historical account of the formulation and implementation of the hospital and medical insurance plans which helped set the stage for the amorphous relationship which exists today between federal and provincial governments in providing health care to Canadians. This relationship forms part of the backdrop for the case histories developed for this study.

Health and Welfare Canada is the principal federal agency concerned with health matters. Branches are responsible for health protection, medical services, and health services and promotion. The department is responsible for the overall promotion, preservation and restoration of the health of Canadians, and for their social security and social welfare. Though Health and Welfare Canada contributes 50% to the costs of health care, it has little or no direct control over actual expenditures.

The medical services branch of Health and Welfare is the health department for the Territories and has a role comparable with that exercised by provincial health departments. Providing medical services to isolated areas of Canada at a standard comparable to that offered to other Canadians is the principal challenge the branch faces. Exploring new and different effective ways to communicate with northern communities is part of this challenge. In the words of three researchers who produced a telemedicine study in the Baffin Zone, "telecommunications are a vital link in the provision of a chain

of effective health care and nowhere is this more important than in the north." [18] Such concerns may have provided the impetus for the apointment of a modest telehealth office in Health and Welfare Canada, to advise on telemedicine developments and sponsor the research in this field, particularly when funding was made available for satellite experiments (from the DOC).

Although the establishment of a telemedicine focus in the mid seventies (in the Department of Health and Welfare) may have helped alert officials to some of the real communication problems of the north, little or no impact seemed to have been achieved in the overall pattern of health care delivered in this region. Health and Welfare, however, was not solely responsible for the implementation of the telecommunication links. The following section explores the role played by the DOC, in fostering the introduction of sophisticated telecommunications for the benefit of health care recipients in the north.

Role of the DOC in Telemedicine

Several authors (Martin, 1984, Picot 1981, Chouinard, 1982) believe that the introduction of communication satellites, space technology, and the genesis of telemedicine are very closely linked. The history of the DOC and its policies of technological development. forms part of the context of telemedicine

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[18] J. Langlois, A. Casey-Stahmer, and H.J. Bagnall, Baffin Zone Telemedicine Study: Final Report (Ottawa: Department of Communications, 1976), p. 14.

development, and the background of this story is fully developed in Chapter Three. Only a brief history of satellite development and its link to telemedicine is provided in this first chapter.

The history of satellite communication development is relatively recent. It began with the launching of the first satellite (Sputnik) by Russia in 1957. Canada's own inauguration to the space age occurred in 1962 with the launch of Alouette I to study the earth's ionosphere. The success of this first satellite was repeated with Alouette II in 1965 and with ISIS I and II in 1969, and 1971. In 1969 Telesat Canada was incorporated by an Act of Parliament to establish a system of domestic satellite communications. In that same year, the DOC was established under Part II of the Government Organization Act.

Anik I was Canada's first communications satellite. The major users of the communications satellite were then, and are now, Bell Canada, and the CBC, supplying services to part of the north. Although telemedicine experiments using terrestrial systems existed in Canada and the USA prior to the launching of the joint Canada-USA satellite in 1976, a major catalyst for telemedicine development was the availability of the Hermes satellite for social experiments. In Canada, telemedicine experiments included linking Kashechewan and Moose Factory to the University Hospital in London Ontario, and linking St. John's Newfoundland with a number of towns around the island. The Hermes satellite experiments were followed by another group

of experiments using channels leased on the Anik-B satellite by the DOC. The University of Montreal Bioengineering Department, Sacre-Coeur and Hotel Dieu hospitals mounted a project to deliver medical specialist support and continuing professional education to La Grande Hospital via the Anik-B satellite. The experiment included both a broadband video and a narrowband audio demonstration. The above-named experiments, pilots and demonstrations and their evaluations are reviewed in the first case study presented in chapter three.

The DOC comprises four branches: policy, space programs, research and spectrum management, and government telecommunications. The role of the DOC, unlike that of Health and Welfare Canada, finds no exact match in provincial governments. Although there are links between space development and telemedicine, Canada's involvement in space had little to do with the eventual use of satellites for health or other public service objectives, but what public service activities did occur were given wide publicity. [19]

Satellite experiments were solicited: a small committee toured Canada and asked for proposals for communication experiments using the satellite Hermes. Once realized, these experiments were not necessarily more significant for health care than, say, other telemedicine projects using land lines, but they required significant commitments of manpower and

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[19] Jean McNulty, "Satellite Broadcasting in Northern Canada," Explorations in Canadian Economic History (Ottawa: University of Ottawa Press, forthcoming).

special budgets and equipment. Along with other such costly projects, these experiments, once approved, became subject to some budgetary scrutiny. This scrutiny took the form of program evaluation, consistent with the wave of program evaluation sweeping all government programs and departments at that time.

The Lambert Commission, formed in 1976 to address the problem of federal budgetary controls, recommended in its 1979 report, that evaluation procedures be introduced to assess the value of certain major government projects. [20] Program evaluation had already become an accepted fact of life in US government circles, and the Comptroller General's office in Canada had begun to adopt program evaluation on a trial basis.

Context of Health Care and Telecommunications

In spite of considerable efforts both on the part of the DOC, and a small band of enthusiasts who pioneered efforts in telemedicine applications, the health care sector has not yet been swept up into the current of the so-called telecommunications revolution. "The literature is filled with experiments or trials, but few of these early applications have become commercially viable." [21] The causes of the reluctance of

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[20] Canada, Ministry of Supply and Services, Royal Commission on Financial Management and Accountability Final Report, March 1979.

[21] Woods Gordon, Uses of Telecommunications within the Health Care System, p. 17.

the health care system to adopt communications technology and integrate it operationally into its organizational context are not well understood, but some practical observations can be made.

The first practical observation is related to the financing of these projects, which has not been consistent for the support of communications projects in health care in Canada. Through recent initiatives launched by the DOC, it would appear the department hopes the health care sector will adopt communications technology on a substantial basis, even though there is no evidence to show this type of trend is emerging. [22] There is no coordinating group which ensures a steady flow of operational funds for telehealth, although both the federal government and the government of Ontario have provided funds for telehealth offices. No significant impact appears to have been made to the overall system by telecommunications technology. A persistent blindspot in some communication entrepreneurs consists in the belief that telecommunications projects in the health care sector will become cost-recoverable in the near future, and might even become extremely profitable. This belief may have contributed to the disorderly pattern of communications use and development in the Canadian health care sector.

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[22] Recent DOC initiatives include funding, by the the telematics group, of several health projects, and the commissioning of a user requirement survey which was completed by Woods Gordon. This survey is reviewed in Chapter Four.

Another practical reason why telecommunications technology has not been adopted on a wide scale appears to be that the health care system is not organized to adapt its own traditional oral and written culture to telecommunications technology. Brown states that:

> "The medical profession as a whole is a cottage industry. The physician resists any attempt to interfere with direct patient contact: he prefers handwritten records to computer tapes and he prefers not to delegate authority to other members of the health care team. These attitudes mitigate against the use of technology to deliver health services." [23]

Further factors which mitigate against the introduction of telecommunications technology for health and medical purposes are found in the boundaries which subdivide the health care delivery system. The boundaries are geographic, as well as interdisciplinary. Health, it is frequently repeated, "is a provincial matter." In addition, there are boundaries which separate specialties, practices, professionals and disciplines in health and medicine. These boundaries have engendered individual jurisdictions, educational programs, licensing, and practice protocols (all highly specialty-bound), which limit the perspective, the activities and the potential for interaction of each profession and discipline. Health and medical professionals are categorized within these boundaries and patients receive services classified within these established specialties. The expertise-based barriers compartmentalize the health and medical

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[23] J.H.U. Brown, Telecommunications for Health Care (Boca Raton, FL: CRC Press, 1981), p.1.

world and tend to discourage the adoption of systems, technologies and approaches which serve to coordinate and integrate activity. An important positive reaction to the over-specialisation found in medicine is the recent rise in the number of holistic health movements which view health problems as part of the context of the entire person and his environment, rather than view a patient with symptoms to be treated, disassociated from the rest of his being and his environment. Most of modern medicine is not yet organized to dispense care to the whole person.

Telecommunications technology can transcend borders (although other problems and obstacles may be created in the process of implementing a telecommunications system), and can cross professional, disciplinary and even cultural lines. Such transcendance tends towards coordination, which ideally, could serve to integrate functions without favoring any one interest group. Early telemedicine projects did not cross professional borders— rather, most simply extended the actual roles of some specialties, e.g., radiology.

Many of the general and particular difficulties stated above were not reflected in telemedicine experiments, pilots or their evaluation reports, for the methodologies were not designed to bring to the surface such problems as these. This problem is explored in the paragraphs which follow.

Evaluation and Program Evaluation

A computer search of only one data base recently revealed that, over a period of fifteen years, from 1966 to 1982, over twenty-seven thousand references with program evaluation as key descriptor had been produced. [24] Such a vast literature base may underscore the tendency for evaluation practitioners to be prolific, but it is also indicative of the quantity of evaluation activity, comment and criticism available in the literature.

A simple definition of program evaluation is provided by the Office of the Comptroller General of Canada (OCG) (1981) as "the formal assessment of the continued relevance and of the effectiveness of existing programs."

At the core of program evaluation seems to be the need for accountability, particularly accountability for programs funded from the public purse. Hence, the greatest rash of evaluation methods emerged in the period following the advent of large-scale social welfare programs, introduced with the great society initiatives of the sixties. According to House (1980), in the US alone, tens of thousands of evaluations of public programs are conducted annually, thousands of people are employed in these evaluations, hundreds of universities and corporations compete for evaluation contracts and hundreds of

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[24] ERIC data base search conducted in January 1983.

millions of dollars are spent each year. [25]

No standard theory or set of methods is at the root of evaluation practice. Practice is often borrowed from one of the many social science fields which have fostered evaluation research as one of its methodologies for experimentation, and from the professions of medicine, engineering and the law. A wide range of practice exists, which has lately been expanded to include such diverse fields as art criticism, anthropology, accounting, and journalism (Smith 1981). House (1981) and Perkins (1977) have provided taxonomies which assist in the classification and grouping of models, methods and purposes. Although multi-disciplinary in nature, evaluation has borrowed heavily from the field of education for the technology of test measurement, from psychology for the controlled experiment, and from other social sciences for applied research techniques of various kinds.

The lack of a substantive, unified body of theoretical knowledge to underpin evaluation research, however, has contributed to a growing body of literature critical of program evaluation. This critique has resulted in a number of reform movements, each one producing yet another model or method. Much of the criticism is rooted in quarrels with methodology. Recently, the debate has shifted to more fundamental ground, with the newer questions being centred on the relevance of

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[25] Ernest R. House, Evaluating with Validity (Beverly Hills, Sage Publications, 1981).

evaluation practice and the need to account for values and ideologies which are at the basis of the implementation of programs.

Program evaluation began in the sixties when sampling and measurement methods had been developed to the point of mass application. A number of factors have contributed to its adoption on a massive scale. Some authors relate the rise in the popularity of program evaluation to the failure of American institutions to deliver the promised dream. For example, many Americans thought the public education system had failed to deliver because the Russians were the first to launch a satellite in 1957. Program evaluation may have become associated, as Myers suggests, with the fact-finding seen as necessary to improve this situation. Somehow, measuring the system's 'flaws' might produce the cure.

In the mid-seventies, the program evaluation enterprise was expanded, institutionalized and finally, legitimized, through the implementation of suitable government measures. Originally a US invention, program evaluation was adopted and institutionalized very quickly in Canada through the assistance of the Lambert commission's recommendations, and the official backup of the offices of the Comptroller and Auditor General.

There have been many criticisms of program evaluation. One type of criticism centres on the failure of evaluation to render a true picture of program effectiveness. This is particularly evident when evaluators attempt to assess new programs or

projects, of which the telemedicine experiments are examples. The emergence of unplanned effects in the course of implementing such experiments or projects make a pre- and post- measurement design ineffective for assessing the total scope and impact of such projects. Moreover, the context of health care is multi-faceted and complex, making it particularly difficult to choose methods comprehensive enough to evaluate the total impact or effectiveness of such a project.

More fundamentally, the issue of value determination in program evaluation is one of its most troublesome aspects, for it is difficult to measure a program's 'worth' without becoming embroiled in value judgements which go beyond simple accountability. Each evaluator, with his own prescription for evaluation research, will approach this issue differently. It is conceivable that in each of the many methods or approaches used, the same fundamentals may be omitted from the evaluation plan. The need for appropriate rationales for the elaboration of such projects and the need to substantiate an approach in a theoretical framework is often lacking. Finally, the need to take into account the viewpoints of the many stakeholders affected by a program or project are central elements which are frequently overlooked simply because the evaluation research design cannot account for these.

While all of these criticisms are not directed at the evaluations of the telemedicine projects and experiments, for rarely were these evaluations of the rigorous, scientific kind,

they are nonetheless valid criticisms directed at much of current evaluation practice.

A number of movements have grown out of the evaluation debates. One is the movement to strengthen evaluation by 'professionalizing' its activities. (Rossi, 1981). Another is the movement to accumulate, compare, and review evaluation findings from a number of studies and group them under the umbrella of meta-evaluation, for which yet another range of methodologies has been developed. Meta-evaluations, like meta-analyses, allow new insights to emerge from previous research and avoid the need for yet another evaluation study, while providing more information than the one-shot study.

The present study began as a meta-evaluation, that is, a review of evaluation reports of previous telemedicine and telehealth projects. Based on previous evaluation reports of telemedicine projects, this review demonstrated the need for a different approach if telecommunication projects are to be assessed for their impact. Such an approach should ideally address a number of the problems cited above. The approach should be applicable to any and all phases of a project, from inception to final phase. Thus such an evaluation has to report more than the results of an experiment. It has to be useful for documentation of various aspects of a pilot project or program, and ideally therefore it should be process-oriented. It should permit the orderly gathering and organizing of information, whether through interviews, documentation searches and

literature reviews, or observation. It should permit decision makers and researchers alike to access and use the relevant infomation.

An opportunity presented itself, in this study, to formulate an approach which would lend itself to this scope of activity. It was also possible to partially test this new approach, through two contemporary case studies.

III. Part Three: Purpose, Focus, Methodologies

Purpose and Focus of the Study

The purpose of the study is to provide a critical assessment of previous methods used to evaluate telecommunications technology in the Canadian health care system, and to explore alternative approaches for project assessement. An equally important purpose for the study is the development of an approach based on a conceptual framework, from which a suitable method can be developed, to capture the broad dimensions of a project. Because of the content of the study undertaken, (in this case, the introduction of telecommunications technology in the health care sector), the approach must allow for emergence of a broad spectrum of relevant data. Often, relevant information is not brought to light because many stakeholders, interest groups and communities affected have no appropriate forum for making their views and concerns known to decision makers. Often, the only link between the stakeholders and decision makers is the researcher, whether he or she is conducting an experiment, a pilot project, a needs assessment, or an evaluation study. Therefore, the approach must be focussed on the stakeholders, with principal emphasis on end users. In the case of research conducted in complex

environments, the approach must also account for context. Finally, particularly in the case of innovative projects, programs and experiments, the approach must account for a variety of emergent, unplanned effects.

Of the many reasons why a different approach is needed, these stand out more prominently:

1. There is no long term history of utilization of any particular technology for communications in the health care system. This short history has not permitted accumulation of enough information about the impact of technological systems for telecommunications in health care to have produced a well-tested methodology for their evaluation.
2. Technology mix varies with each project and the technology is in rapid evolution, making planning and assessment controls difficult, since no two projects are alike.
3. Telecommunications technologies are transdisciplinary, providing a need for a method which is not specific to one discipline, field or specialty for the assessment of programs which embody the use of such technologies.
4. Telecommunications technologies tend to be coordinative in function. There are few incentives for coordination and integration in the health care system.
5. The projects examined have not developed into 'services' on a long-range basis, and this non-integration into the Canadian health care system as a whole, provides additional evidence that telecommunications technology is not yet well

adapted to this complex field and vice versa.

6. Evaluation approaches which use experimental designs tend to isolate the programs under scrutiny in order to measure more carefully what are seen as the relevant factors and variables. Such research designs, when applied to the evaluation of telecommunications projects, do not examine the problem of non-integration mentioned above.
7. In order to portray the full impact of a telecommunications project in an evaluation report, the positions, realities and divergent opinions of many stakeholders must be documented. If future policies are to be decided these views must be made available to the decision makers and must be portrayed as accurately as possible. To ensure policy-makers will use the information, the material must be easily accessible. Participants themselves should have direct input into an evaluation report, and any number of media may be used as vehicles for gathering and organizing data. In the case of the present study, it is suggested that the technology itself be used to store and access the information.
8. It is often not possible to determine, a priori, what changes are likely to occur when innovative programs are introduced.
9. The communications 'expert' attempting to plan the appropriate system for health care needs is often hampered by a poor understanding of the complexity of the health care

system.

10. On the other hand, the potential user of telecommunications technology in the health care field is unable to pinpoint for the communications expert what is the appropriate application for the technology, because he/she does not know what technology is available to respond to his/her needs.
11. Health professionals in general need more awareness and experience with telecommunications if an appropriate match between their needs and the telecommunications technologies is to be achieved.
12. When governments implement innovations, inappropriate decisions are often made because political realities take precedence and do not take into account the needs of long-term users.
13. The uncertainty with which the planners and potential users of telecommunications systems approach the implementation of such systems (to improve the delivery and organization of health care) points to a serious need for an unconstrained examination of motives, rationales and needs for telecommunications technology in health care. No evaluation model can work if it does not encompass such a way of examining the implementation of new or novel projects.

This study is directed at planners and government officials, professionals in the health care system, communications analysts and evaluators alike. By presenting the theoretical bases for both a critical assessment and a new

approach to evaluation, the study is not bound in method to one type of technology, one subset of the health care system, and only one approach. The method developed is portable to other situations where implementation of communication technologies is a possibility.

Methodologies

The study is descriptive and incorporates a number of essentially qualitative methodologies. It incorporates reviews of three different literature bases, for telemedicine, program evaluation, and needs assessment. The theoretical framework was developed from a fourth source, provided by a combination of evaluation reform literature sociology and medical sociology. [26]

The study uses a case history approach as recommended by a number of researchers, in particular, Robert Stake. [27] A recent manual produced by Robert Yin (1984) has also been used sparingly, and only at the stage of analysis, mainly because its very recent publication made it inaccessible during the period of the conduct of the three case studies. There are three different case studies embodied within the dissertation. Using what Yin describes as an explanation-building strategy, the study progresses through the three distinct cases, to arrive at

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[26] All literature searches were done using the following data bases: ERIC, CISTI, CATLINE, SSCI, MEDLINE, HPA.

[27] Robert E. Stake, "The Case Study Method in Social Inquiry," Educational Researcher 7(1978):5-8.

an approach for examining the introduction of telecommunications technology in health care. The approach which is developed, described, and partially tested or demonstrated in the final chapters, utilizes grounded theory as a guiding framework. [28]

The case study method was combined with a form of meta-evaluation, a research method used to aggregate evaluation information from previous studies to gain new insights. Of a number of possible methods used to conduct a meta-evaluation, the essay-review style was chosen [29] because of the limited size of the sample under study and the wide range of methods used in each individual telemedicine project under review. To round out this study, interviews of project directors and government officials, and site visits to each one of the projects were also done.

The case study method was again used to document the contemporary case studies found in chapter five. Both of these contemporary studies were conducted with the objective of establishing whether or not 'need' for communications technology exists in Canadian health care. Using an open-ended interview method provided by Hyman(1975) and Dexter (1970), the transcripts of the interviews were used to provide the principal source of data. An approach consistent with the grounded theorists' field research methods was developed and partially

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[28] Robert K. Yin, Case Study Research Design and Methods (Beverly Hills, CA: Sage Publications, 1984.

[29] Thomas D.Cook and Charles L. Gruder, "Meta-evaluation Research," Evaluation Quarterly , 2(1978):5-51.

tested in the course of the final study.

In an extensive review of evaluation methods, authors Guba and Lincoln, for example, found the grounded theory framework to be the most applicable for program evaluation. This approach was tested in the final study in a substantially different way than has been possible in other studies, with the availability of a computer program which made aggregation and analysis of the data easier to handle for researchers, program stakeholders, and decision makers alike. [30] The salient features of the framework are outlined below.

Framework Provided by Grounded Theory

Grounded theorists have used a variety of research techniques to conduct research in health care institutions and organizations. As the term grounded implies, their methodology is based on the development of theory from the ground of their research,(usually field research), rather than the other way around, which normally places the researcher in the position of first, formulating the theory, and then, seeking to prove or disprove it. Grounded theory researchers depart from classical field research methods in this and other respects. Their approach has been recommended by some evaluation critics and

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[30] Similar techniques have recently been described in a text by Miles and Huberman. See Matthew B. Miles and A. Michael Huberman, Qualitative Data Analysis: A Sourcebook of New Methods (Beverly Hills, CA: Sage Publications, 1984).

reformers as an appropriate one for use in program evaluation.

In the program evaluation literature (along with the literature from the social sciences), one can identify two guiding paradigms, each with its own methodologies and styles of performing research and evaluation. These are the scientific and naturalistic paradigms. Much has already been written about the two models, and some of the differences are summarized well by various writers. Guba and Lincoln (1981), for example, provide an outline of the essential differences, relating these to program evaluation.

Because the paradigm adopted by the researcher guides the researcher's choice of method for obtaining truth, it is extremely important to understand the evaluator's guiding model or framework if one is to place the results of the inquiry into perspective. The scientific paradigm is based on logical positivist epistemology and the naturalistic paradigm is based on a phenomenological epistemology.

A scientific inquirer relies on experimentation as a fundamental technique. Here truth is confirmable– a hypothesis to be confirmed or rejected by an actual experiment. Hypotheses are derived from a priori theory. Exemplars where this paradigm guides research are found in the physical and life sciences. The fundamental technique for research is experimental.

A naturalistic researcher relies on field study where truth is judged to be ultimately inescapable. Sufficient immersion in the experience yields inevitable conclusions. Examples where the

naturalistic inquiry method is used include anthropology, ethnography and history. The fundamental technique is field study.

For the scientific inquirer, reality is singular and fragmentable. For the naturalistic inquirer, reality is multiple and inter-related. In the scientific paradigm, the inquirer remains aloof from his subject, in order to be more objective. In the naturalistic paradigm, the inquirer inter-relates with the subject-matter of the inquiry.

Much social-behavioral inquiry has been directed to the verification of hypotheses generated from logical, deductive, a priori theory. While the testing of theory is important in any discipline, theory generated by logical deduction from a priori assumptions must usually be verified through isomorphism with the real world. The grounded theorists suggest that the more useful approach to generating a theory is through discovery. In order to collect data for analysis and for the formulation of theory, grounded theorists use multiple methods to gather data. However, rather than place emphasis on the naturalistic vs the scientific paradigm debate, the grounded theorists claim that the real problem has been undue emphasis on verification of fact. This is what has constrained social inquiry, permitting hypotheses to be developed without adequate knowledge of the context and problems.

Grounded theory allows a range of methods for collecting and analyzing data. Indeed multiple methods are recommended,

both quantitative and qualitative. In this approach, the context and the user can be given primary importance. The approach used in this study was formulated following a review of the evaluations of previous telemedicine projects, in the first case study, and in the literature reviews. Through a careful reassessment of the documentation (presented in Chapter Three), it was demonstrated that the evaluation methodologies used had produced but an incomplete picture of the impact of such projects. The introduction of communications technology in the health care field must be considered in association with the context, and in relation to their intended use as communication links. Therefore the implementation of these systems requires a careful in-process examination of a variety of factors.

The approach developed using this and Stake's case study framework of inquiry resulted in data which, when analyzed, could lead to the formulation of theories which can be tested through further research. Briefly, the specific steps followed for this type of research are as follows:

1. Open-ended research tools are developed to guide interviews of key persons. Observations are made of representative environments, and situations.
2. The investigator enters the field to be studied and spends a considerable span of time gathering data using the tools formulated above.
3. The tools are refined, as needed, for a more comprehensive collection of data: such data may include interviews,

documents, statistical studies, comparative studies and the like.

4. The data are organized and grouped to permit the researcher to see emerging patterns, if they exist.

The grounded theorists have described detailed methods for arriving at theory, and for testing the theory for 'fit'. In the initial stages, they gather data for coding and analysis. As their field research continues, they constantly inspect the emerging data to guide their analysis. In order to do this systematically, they formulate a method called the "constant comparative method" the purpose of which is to generate theory systematically from emergent data. [31] There are a number of steps which grounded theorists use to test their data for 'fit' in the generation of theory. These were not attempted in this study. Rather, the grounded theory methodology was tested providing a demonstration of an approach which could be explored with further research. The coding procedures described by Glaser and Strauss were replaced by another method using text processing to aid in labelling and grouping comparable information. The method permits the examination of emergent 'themes,' which are analogous to the emergent data used by Glaser and Strauss to formulate theory.

The method was tested in the third and last case study presented in this thesis, where all of the interview data were

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[31] Barney G. Glaser and Anselm L. Strauss, The Discovery of Grounded Theory (Chicago: Aldine Publishing Company, 1967).

entered as computer text. Once entered, it was possible to reorganize the text, without losing its contextual associations. In other words, it is possible to study the interview in its entirety, or in association with other interviews and other information gathered in the field through observation, for example.

In order to group and compare the data, emergent themes (or topics) were identified and inserted without distorting the acquired data. The labelling procedures also facilitate access to the data, thereby permitting readers (e.g. decision makers) to inspect the interview data by viewing the entire file of research notes, or the entire set of interview comments with respect to any one of the themes.

IV. Part Four: Limitations, Assumptions, Significance

Limitations

The study's most serious limitation was the nonavailability of quantities of previous studies against which the applicability of the evaluation approach recommended could be tested. The meta-evaluation study was based on the results of a small number of telemedicine and telehealth pilots and experiments, although quantities of reports are available for each one of these individual experiments. The project literature represents a spectrum of experiments, quasi-experiments and non-experimental studies. From one project to another, there is little information which is common, recurring, or similar in approach and technological configuration. Nonetheless, it has been possible to use the project reports to gain valuable insights. The overall study is therefore characterized as exploratory rather than definitive in its findings.

Lack of a priori knowledge also exists in the matter of long term effects of telecommunications on any aspect of the health care system, or on the system as a whole. One advantage presented by this paucity of information and experience is that the 'fresh approach' is still possible.

The first case was 'historical', limited to those Canadian telemedicine projects utilizing satellites Hermes and Anik-B as the primary telecommunications link, over the period 1976-1981. The projects and their technologies may limit the applicability of the results to other situations. Since these projects are now completed, it is not possible to use their results to uncover new data. However it was possible to interview the principal actors and shed new light on reported information.

The second case study is that provided by the interviews, (forty interviews were conducted and recorded) documentary reviews, and observations preparatory to the development of a proposal for a national health network. This proposal was commissioned by a national health association (the Canadian Hospital Association). Following a series of interviews and observations in the field, a proposal was prepared, which describes a plan for a future Canadian health care network. So therefore it is limited by its 'futures' orientation. It represents a proposed rather than an actual project. [32]

The third study is focussed on an educational network (the Knowledge Network) which employs a number of telecommunication links to deliver broadband educational programs to learners in remote B.C. sites, often in their own homes. This study was developed through a documentation of the history of the

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[32] Following the development of the proposal, it was submitted to a granting agency in the summer of 1982 to obtain funding for a network. Funding was not received. However, a modified version of the proposed network is now in place, linking health care associations across Canada.

implementation of the network, and through a report of the perceived needs of a health care community for the services of the network. The needs were documented through interviews of selected key players in health and medicine located in the region and institutions served by the network. Although a large number of interviews was conducted for this study (98 respondents had input into the study, either through individual interviews or meetings with groups), one of its limitations arises from the necessity to be highly selective in choosing interviewees from a very large number of potential informants.

The findings of both contemporary studies are the result of documentary research and interviews conducted in an open-ended fashion, making it difficult to aggregate and group the information. In both studies, the approach used was constrained by the varying degree of interest and knowledge of communications technology which each respondent had. As well both the contemporary case studies were undertaken during periods of dramatic funding cutbacks in health care which no doubt influenced responses.

There are other limitations to the study which should be noted. The first is that, by comparison to the vast literature of program evaluation, relatively few reports of needs assessments and needs analyses are available for comparison. Secondly, the approach recommended, although used in a 'needs analysis' context, is assumed to be applicable in most phases of a study which examines the introduction of communications

technology. It was not possible to test the approach in the final or evaluation phase of such a study.

A brief statement should be made about some of the limitations of the framework used for this study. The first problem is that any two analysts or researchers conducting this same study, however attentive to detail and meticulous in their gathering of information, may not arrive at the same theories which can be tested through further research. Glaser and Strauss (1967) state that even given the same data, their constant comparative method might not yield the same theories. Therefore exact replicability of the type of study presented here is not possible. [33] Secondly, because the framework operates to discover rather than test a priori theory, it is difficult to bound the study. Glaser and Strauss and Schatzman and Strauss (1973) have described techniques which can be used to limit the study, but the methods they describe require a wide range of experience and skills along with a substantial methodological tool kit not always available to those conducting exploratory research.

There are no doubt other methodological limitations to this study. Some of these are embedded in the problems associated with case study research, generally. Yin has described five general characteristics of an "exemplary" case study. The study must (1) be significant, (2) be complete, (3) consider

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[33] It should be noted that this framework also allows data to be gathered and analyzed quantitatively, which could eliminate this problem.

alternative perspectives, (4) display sufficient evidence, and (5) be composed in an engaging manner. Because most of these attributes of the case study call for individual judgement on the part of the researcher and the reader alike, it is probably no simple matter to find common agreement amongst scholars, practitioners and researchers in rating this study for its success in meeting the above-listed attributes. Therefore, possibly only the test of time will permit the case study to be compared, favorably or unfavorably, with similar studies.

Assumptions

The assumptions underlying this study include the following:

1. Telecommunications technology should be evaluated in consideration of the context of health care.
2. Communications in health care is the responsibility of both recipients and care providers. Potentially, an entire community becomes a stakeholding audience for the evaluation of such a project.
3. It is asssumed government programs will never be put into effect without some form of 'evaluation' or the equivalent alternative being required for funding and accountability. Some form of project reporting will normally be required.
4. The health care system is very complex and multidimensional. Introducing telecommunications technologies in this system

requires a sufficiently comprehensive procedures and methods if all of the effects are to be captured, examined and understood.

5. It is inappropriate to examine the introduction of telecommunications technology from a narrow perspective, although appropriate to examine it through the level of the end user.
6. Communications in health care can be improved but the improvements may or may not require technology.

Significance of the Study

There is increasing interest in governments, in health care institutions, and in the private sector, for implementing systems and for increasing telecommunications activity in the health care system. [34] Hence, telecommunications system implementation is likely to undergo a dramatic increase over the next decade. The DOC is aware that opportunities exist for research and for introducing new technology in this sector. Following the end of the satellite experimental era, more demonstrations, trials, and experiments are now likely to be mounted in response to new opportunities. Indeed, the DOC commissioned a user requirement survey recently so as to better understand the specific components of the health care sector. As

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[34] See Jocelyne Picot, "Telecommunications: The Market Is Ripe," Dimensions in Health Service 60(September 1983):52-53.

such projects or pilots are introduced, this study should guide researchers, users and decision makers alike in the choice of an appropriate method for selecting communications links and systems, if any is needed. Users and officials alike must be better informed regarding the issues which were raised through the first telemedicine experiments and pilots, in order to avoid such pitfalls in the future.

As well, there are some very real concerns which go hand in hand with the introduction of telecommunications technologies: the tendency for centralization, the tendency to cause changes in the human interaction patterns of the organization, and the dangers to privacy. Some of these issues come to light in this study, which will help guide future implementation, and future research. Finally, the approach evolved and used in this study has a broad range of uses: the conceptual framework is appropriate in innovative situations particularly where the context is complex. Secondly, the technique of gathering and analyzing narrative data is relevant in a number of research and survey situations. With the advent of wider and wider use of micro computers, the technique devised in the last study will make it easier for researchers to study qualitative data gathered by multiple means.

Two trends in the application of communications technology for health and education should be mentioned. These are trends towards networking and the formation of consortia.

Networking can permit a number of individuals or institutions, and their technologies (host computers, teleconference bridges, television studios) to be linked such that each one of the centres has access to a wider range of educational materials or information stored in data bases, owned and operated by one or more of the groups. This phenomenon is on the increase with the ease of communications provided by recent developments in data networks. The second trend, consortium-formation, allows a variety of groups and institutions to combine their resources and provide users with a wider range of sources of information. As examples, we have seen the development of computer networks to aggregate data bases, and the linking of institutions to provide video programming. These two trends both suggest that more and more users will have greater access to the technologies and their associated communication routes, permitting participants to access and input information. Hence, the type of data collection described in chapter five for the last case study becomes easier to envision, as participants are able, in this electronic environment, to record and document their reactions and their comments.

It is interesting to note that most recently, computer conferencing has regained popularity, and groups and individuals can easily communicate in this way, where powerful software programs allow participants to record either private or collective communications. The provision of the 'open agenda'

which is developed in such communiques can provide reservoirs of data from which themes can emerge, possibly to be analyzed in the manner suggested by this study.

V. Part Five: Organization and Plan of the Study

The overall study is organized according to the following outline.

Chapter One has outlined the general background, the problems examined, the purpose of the study, the methodologies, scope and limitations. The significance of the research was overviewed, the assumptions were identified and the specific case histories were outlined.

Chapter Two presents a literature review of program evaluation. The literature reviewed is that pertinent to program evaluation, program evaluation critique and reform. This literature base is vast, and the review is selective and representative, not comprehensive.

The first case history is presented in Chapter Three and consists of the telemedicine projects using Canadian satellites as the principal communications link. The story of the satellite telemedicine projects is reviewed using interviews, site visits, and a review of all of the project reports and other documents relevant to the experiments and pilots.

Chapter Four contains two literature reviews, one overviews a selection of reports and articles describing other telemedicine project research, particularly those using land lines. The other literature review is centred on needs assessment and needs determination, with particular emphasis on

a few surveys of need for telecommunications technologies. Included is a review of a recent user requirement survey of health sector needs for communications technologies.

Chapter Five presents the two contemporary case studies. One examines the need for a national health network for the Canadian health care system, and another reviews the needs of a particular health care community for the communications technologies of an educational network. In the course of the second contemporary study, a revised approach to assessment is developed and partially tested.The approach is based on the concept of grounded theory and incorporates the use of a computer program designed to capture and categorize narrative data, making them accessible to all stakeholders and providing a framework for future analysis of the information gathered during the study.

Chapter Six addresses the fourfold task of synthesis, analysis, conclusion and summary. This chapter also outlines the theoretical framework used as a basis for conducting future research of this type. The chapter draws the overall conclusions of the entire study, and points out areas for future research and study.

B. Chapter Two: Program Evaluation: Background and Literature Review

Introduction

The first case history to be presented as part of this study (refer to Chapter Three) includes a detailed discussion of the evaluation reports of the Canadian satellite telemedicine experiments, each one an example of a different evaluation procedure or method. In order to examine more closely the methodologies and the perspectives which underlie these and other evaluation procedures, it is necessary to review the topic of program evaluation and the background literature pertinent to it. Such a review will help lay the groundwork for the development of a conceptual framework which guides a new approach to the introduction and examination of communications technology in the health care system.

There are three parts to this chapter. Because the literature base for program evaluation is vast, selected authors only are reviewed in relation to the relevance of their writings for this study. Thus, each part which follows incorporates a review of the literature pertinent to the particular discussion of that section or part. The review is illustrative and not meant to be exhaustive. Because of the broad selection of material, no one author is treated in depth and detail. Rather, the readings are grouped under the various headings and sub-headings, thereby shifting attention to the ideas and topics under discussion rather than to the specific authors reviewed.

In the first part, evaluation and evaluation research are defined, along with descriptions of mainstream methodologies. Included in this part are some of the concepts which underlie a variety of quantitative and qualitative evaluation approaches. Brief reference is made to the proponents of various evaluation models through the writings of classic evaluation practitioners such as Caro,[1] Rutman, [2] Rossi and Wright, [3] and Scriven [4]

The second part traces the history of the legitimization of program evaluation in government, beginning with the US history, and progressing through to the Canadian federal government's involvement in program evaluation. This involvement began in the early 70's. It was later buttressed by the Lambert Commission's recommendations (1976 to 1979) and accompanied by the formal introduction, by the Auditor General and the Comptroller General, of procedures and guidelines for the evaluation of federal programs in many departments, divisions and ministries.

The third part reviews the principal debates and the critical literature of program evaluation. Some of the writings

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[1] Francis G. Caro, Readings in Evaluation Research (New York: R. Sage Foundation, 1971).

[2] Leonard Rutman, Planning Useful Evaluations: Evaluability Assessment (Beverly Hills: Sage Library of Social Research, 1980).

[3] Peter H. Rossi and Sonia R. Wright, "Evaluation Research," Evaluation Quarterly 1(1977):5-51.

[4] Michael Scriven, Evaluation in Education: Current Applications (Berkeley, CA: McCutchan Publications, 1974).

featured include Jordan and Sutherland, [5] Cronbach,[6] House,[7] Guba and Lincoln,[8] Hamilton and others. [9] The criticism centres on issues related to methodological debates, to the role of the political context, to the use or misuse of evaluation findings, to the questions surrounding values in evaluation, and to the setting and measurement of objectives, sometimes to the exclusivity of other emergent program effects. More fundamental, however, has been the criticism which centres on philosophical issues related to the lack of theoretical or substantial conceptual orientation to the practices and procedures of program evaluation.

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[5] J.M. Jordan and S.L. Sutherland, "Assessing the Results of Public Expenditure: Program Evaluation in the Canadian Federal Government," Canadian Public Administration 22(1979):4.

[6] Lee J. Cronbach et al, Toward Reform of Program Evaluation (San Francisco: Jossey-Bass Publications, 1980).

[7] Ernest R. House, Evaluating with Validity (Beverly Hills: Sage Publications, 1981).

[8] Egon G. Guba and Yvonna S. Lincoln, Effective Evaluation (San Francisco: Jossey-Bass, 1981).

[9] D. Hamilton et al, eds. Beyond the Numbers Game: a Reader in Educational Evaluation (London: MacMillan, 1977).

I. Part One: Program Evaluation

Scope of the Activity

According to Meyers,[10] since the early 70s, there has been a phenomenal growth in the enterprise of evaluation, resulting in expenditures by the US government of 130 million dollars in one year alone.

According to Rutman,

> "Although there are precedents of program evaluation that date back to the 1930's, it is only in the last decade that it has become a 'growth industry'. ... Virtually every [US] federal department now conducts program evaluation. Hundreds of millions of dollars are being spent on evaluation activities, involving thousands of executive agency staff years." [11]

According to Meyers, only two books written in the 1960s received much attention, but the Handbook of Evaluation Research is reputed to have sold over fifteen thousand copies in the first year of publication. [12] An Evaluation Research Society was formed in 1976, and several universities began offering doctoral and masters' degree programs in evaluation research. A national

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[10] William R. Meyers, The Evaluation Enterprise (San Francisco: Jossey-Bass Publications, 1981).

[11] Rutman, Planning Useful Evaluations, p. 20.

[12] Elmer L. Struenig and Marcia Guttentag, Handbook of Evaluation Research (Beverly Hills: Sage Publications, 1975).

directory of evaluation consultants was drawn up. [13]

In Canada, federal government evaluation activity has also been on the increase since the early 70s. Each department and division now has an evaluation function and the office of the Comptroller General has published a number of guides, [14] and acquired a large well-staffed department to provide evaluation advice and conduct program evaluations. Workshops, seminars, and conferences for persons at the senior and middle management levels have been held. [15]

A recent computer search of only one data base revealed that the past fifteen years have produced 21,277 references with program evaluation as a key descriptor.[16] This vast literature base perhaps illustrates that there are many unresolved issues and debates in this emerging field of activity, or it may underscore the tendency for evaluation practitioners to be prolific writers. Whatever the reason, it is certainly an indicator of the quantity of evaluation activity, comment and criticism being produced, which contributes to a certain amount of confusion about program evaluation. It becomes a difficult

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[13] R. Johnson, National Directory of Evaluation Consultants (New York: Foundation Center, 1981).

[14] For example, see the Guide on the Program Evaluation Function by the Office of the Comptroller General (Ottawa: Treasury Board, 1981).

[15] J. Tombaugh, "Annotated Course Outline for Evaluation Research Workshops," one workshop given at Carleton University, Ottawa, March 1979.

[16] ERIC database was searched on January 12, 1983.

task for the researcher and the practitioner then, to pare down this veritable forest of information, and choose relevant materials when conducting a review of the literature.

In choosing relevant readings for review in this chapter, three factors were considered. First, authors were drawn from classic mainstream writing. Secondly, readings were selected from reviews and collections which have been used extensively to inform evaluation practice and criticism generally. Thirdly, readings were selected from evaluation critics and reformists. Reference is made to a number of reviews and collections which feature these writings.

Some definitions

There are many definitions of program evaluation. Evaluation is generally defined as the process of determining the value or the amount of success in achieving a predetermined objective. A program is defined as a plan presenting a group of interrelated activities aimed at achieving specific objectives. Meyers defined evaluation as "the effort to understand the functioning and effects of a program, which is a planned sequence of activities intended to achieve some goal." [17]

Epstein and Tripoli presented a simple definition of program evaluation which they thought useful to administrators and planners: "Program evaluation is the process by which

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[17] Meyers, The Evaluation Enterprise, p. 1.

program effectiveness and efficiency are assessed." [18] Efficiency (or value for money), a term frequently used in government guidelines and documentation about program evaluation, is defined in terms of the resources deployed to achieve a given program goal. Effectiveness, on the other hand, refers to the program's relative success in achieving stated and implied goals. [19]

A program evaluation guide from the office of the Comptroller General of Canada defines program evaluation as

> "...the formal assessment of the continued relevance of the effectiveness of existing programs... Program evaluation is the periodic independant and objective review and assessment of a program to determine in light of present circumstance, the adequacy of its objectives, its design and its results both intended and unintended." [20]

Harry Rogers, Comptroller General of Canada, defined program evaluation (PE) as follows:

> "The term 'program evaluation' is now widely used as an umbrella to cover a great variety of attempts to arrive at objective and coherent overviews of the effectiveness with which the tasks of government are performed. Program evaluation is no one technique but it is in effect the application of the best current empirical methods of investigation in the social sciences. The aim is to generate information about whether or not specified goals are being reached well, or at all." [21]

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[18] Irwin Epstein and Tony Tripoli, Research Techniques for Program Planning Monitoring and Evaluation (New York: Columbia University Press, 1977), p. 111.

[19] Government of Canada, Auditor General of Canada, Study of Procedures in Cost Effectiveness (SPICE) (Ottawa, 1978).

[20] Government of Canada, Office of the Comptroller General, Program Evaluation, An Introduction (Ottawa, 1981), p. 2.

[21] G. Bruce Doern and Allan M. Maslove, eds. The Public Evaluation of Government Spending (Toronto: Butterworth & Co.,

But later on in the same paper, he seems to hedge a bit regarding the best current empirical methods and states:

> "... these complexities of the effort called program evaluation really indicate that there is no one neat set of techniques to apply across the board. They mean that components of all possible qualitative and quantitative strategies of judgemental and analytical procedures must be applied in a creative fashion to problems and activities in context."[22]

Many other definitions of program evaluation exist. In fact one of the main problems of the field is precisely the wide range of definitions possible, each implying a different perspective and often necessitating a different methodological approach. Therefore it is more useful to address the topic by examining the literature which deals with the practice of program examination. This, then, gives rise to an examination of the perspectives which drive the different research designs, issues, methods and applications. Finally, through such an examination, critical thought and writing which centre on different evaluation issues can be reviewed.

Evaluation and Evaluation Research

Most evaluation treatises distinguish or imply a distinction between program evaluation (PE) and evaluation research (ER), but, according to some authors (e.g. Bernstein and Freeman) "there is no commonly accepted definition of the

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[21](cont'd) 1979), p. 81.

[22] Ibid., p. 83.

term evaluation research."

Caro thought ER should emphasize outputs or effects, use the 'scientific method' and "procedures designed to test for causal connections."[23] Rutman defined ER as "... first and foremost, a process of applying scientific procedures to accumulate reliable and valid evidence on the manner and extent to which specified activities produce particular effects or outcomes." [24] Struenig (1974) provides this definition of ER:

> "Evaluation research is defined as the application of scientific principles, methods and theories to identify, describe, conceptualize, measure, predict, change, and control those factors or variables important to the development of effective human service delivery systems." [25]

A slightly enlarged definition is provided by Rossi:

> "If we define evaluation as the application of social science knowledge and research methods to the assessment of social programs, it is clear that traces of evaluation activities can be found from the beginnings of empirical social research." [26]

A comprehensive view of ER is taken by Parker

> "Evaluation research (ER) represents an attempt to deal with these issues systematically, in a framework that involves employment of the scientific method together with the application of the tools and techniques of social research... In general ER focusses on the degree to which a program has achieved its goals, as well as on the acitivities and processes by which these goals are

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[23] Caro, Readings, p. 5.

[24] Leonard Rutman, ed. Evaluation Research Methods: a Basic Guide (Beverly Hills: Sage Publications, 1977).

[25] Struenig and Guttentag, Handbook, p. 521.

[26] Peter H. Rossi, "The Professionalism of Evaluation Research", in Evaluation Research and Practice, ed. R.A. Levine et al. (Beverly Hills: Sage Publications, 1981), p. 220.

sought.... From a data-analytic standpoint, this implies a concern with the far-reaching notion of 'process analysis', whose purpose it is to make inferences about program outcomes as functions of program characteristics." [27]

Appropriately, Parker uses the terms ER and PE interchangeably throughout his review essay on the subject.

The Evaluation Paradigm

John Mann summarized the evaluation paradigm as follows:

"In order to perform an evaluation study it is necessary to compare the amount of change experienced by members of two equivalent groups, only one of which is exposed to the behavior-change process.

To design such a form of investigation it is necessary to define the method of behavior change to be applied, select appropriate measures of the change, and apply the process to one or two similar subject groups. Nothing could be simpler...."

But he immediately cautions that:

"... in practice the application of this straightforward abstract model leads one into a maze of technical obscurities and problems created by social pressures which collectively interact to make evaluative studies one of the more difficult ventures in the social sciences." [28]

Parker compares evaluation to a management information system, and states that evaluation information must be understandable, relevant, and conclusive. He then goes on to represent what he calls the evaluation paradigm, in five analytic steps:

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[27] Barnett R. Parker, "Statistical and Other Data- Analytic Techniques for the Evaluation Researcher," Journal of Health, Politics, Policy and Law 4(1979):273-333.

[28] John Mann, "Technical and Social Difficulties in the Conduct of Evaluation Research" chapter 15 in Caro, Francis Readings, 1971.

(1) Formulation of relevant evaluation questions and measures of program merit: measures may range from simple observations to more formal statistics such as social indicators.

(2) Construction of evaluation design: a strategy is chosen that identifies how individuals are to be grouped and variables manipulated. Different evaluation designs may be applied, ranging from the nonexperimental, the quasi-experimental, and the true experimental.

(3) Sampling: an appropriate sampling strategy is identified to fit the experimental design chosen.

(4) Collection of evaluation information: procedures are developed to collect information. They include tests, scales, archival reviews, interviews, and so on.

(5) Data analysis and interpretation: analytic methods are employed to examine the program data generated in an effort to answer the evaluation questions. These techniques are principally statistical in nature, and can be simple (univariate), multivariate, and miscellaneous procedures.

Several authors have discussed the various problems associated with evaluation research. Mann, for example, outlined 4 classes of difficulty, each one related to the instrument, the practitioner, the placebo effects and finally, the control problems due to the experimental method. He concludes a compromise is needed between "scientific rigor and clinical practicability."

A common thread throughout evaluation research places importance on correctness of experimental design. This has led to a tradition of defining program evaluation in scientific language and structural phraseology not unlike the language of the clinical or scientific laboratory. A representative sample of the terminology is provided by D.T. Campbell. In his article, he lists as threats to validity in 'quasi-experimental design' such items as 'instability', 'instrumentation', 'regression artifacts', 'experimental mortality' and 'selection-maturation interaction'. As threats to external validity he lists 'interaction of selection and experimental treatment', 'multiple treatment interference', and 'irrelevant replicability' of treatments. He describes interrupted time-series designs along with regression discontinuity designs and shows a series of scatograms from some of his case studies. He concludes his discussion with the following passage, quoted here at some length to illustrate the phraseology:

> "We should not only do hard-headed reality testing in the initial pilot testing and choosing of which reform to make general law; but once it has been decided that the reform is to be adopted as standard practice in all administrative units, we should experimentally evaluate it in each of its implementations. .... Trapped administrators have so committed themselves in advance to the efficacy of the reform that they cannot afford honest evaluation. For them, favorably biased analyses are recommended, including capitalizing on regression, grateful testimonials, and confounding selection and treatment. Experimental administrators have justified the reform on the basis of the importance of the problem, not the certainty of their answer, and are committed to going on to other potential solutions if the one first tried fails. They are therefore not threatened by hard-headed analysis of the reform. For such, proper administrative decisions can lay the base

> for useful experimental or quasi-experimental analyses. . . . Through the . . . use of staged innovation. . . true experiments with randomly assigned control groups can be achieved. If the reform must be introduced across the board, the interrupted time-series design is available. If these are similar units under independent administration, a control series design adds strength. If a scarce boon must be given to the most needy or to the most deserving, quantifying this need or merit makes possible the regression discontinuity analysis."[29]

As a result of the more rigid stances adopted by some evaluation specialists of the empirical orientation, a number of methodological debates arose. A movement away from strict experimental design was introduced as early as 1969 by Weiss and Rein who wrote a landmark article on the subject, recounting their difficulties in evaluating a broad-aim program using a strict experimental design.[30] After reviewing some methodological problems, including difficulties in selecting appropriate criteria, they recommended the case study approach be used as an alternative to the classic experimental research design technique. This departure from the classic experimental paradigm opened the door to new qualitative methods and procedures in evaluation research.

Several methods and means for collecting data and even analyzing it may now legitimately be incorporated to examine one program at different stages. 'Formative' and 'Summative' evaluations have permitted the use of more than one methodology to study the one program. Less rigorous methods and practices

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[29] Struenig and Guttentag, Handbook, pp. 71-100.

[30] Robert S. Weiss and Martin Rein, "The Evaluation of Broad-Aim Programs: Experimental Design, its Difficulties and an Alternative," Administrative Science Quarterly 15(1970):97-109.

are 'permitted' under the umbrella of 'formative' evaluation, without departing from what passes for scientific research. The stricter regimen of the scientific study is reserved for those evaluations under the 'summative' label. Both types are briefly described below.

Formative and Summative Evaluation

A substantial difference exists between evaluation done in-process, and evaluation which measures the impact of a total program. A number of evaluation practitioners have outlined the differences, notably Scriven. [31]

Summative evaluation is labeled "effectiveness evaluation" (Rutman 1977) or 'impact' evaluation and is characterized by an emphasis on the best experimental design for finding causal relationships. It tests hypotheses, and it is used to judge a program by determining if program goals have been met by measures which verify program effects and test causal links.

Formative evaluation, also called process evaluation, was described by Rutman as providing a systematic assessment of whether or not a program operates in conformity to its design. Sometimes process evaluation is conducted to find out simply if the program was actually undertaken.

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[31] R.W. Tyler, R.M. Gagne and M. Scriven, eds. Perspectives of Curriculum Evaluation AERA Monograph Series on Curriculum Evaluation no. 1 (Chicago; Rand McNally, 1967), pp.39-83.

Lawson provides the following description of formative evaluation in reference to educational products:

> "The major purpose of formative product evaluation is to provide both descriptive and judgmental information regarding the worthiness of an instructional experience. Descriptive information can be used to define or characterize the adequacy or inadequacy of various instructional components: for instance, the degree of specificity of instructional objectives. In contrast judgmental data can be employed to determine the learning or instructional implications of descriptive data. . . .... formative evaluation focusses upon various aspects of instruction so that data are provided regarding both anticipated and unanticipated effects of these elements. . ." [32]

Evaluability Assessment

Recently, an additional step called evaluability assessment has been developed as part of formative or process evaluation. It was introduced by Wholey and Rutman (1980) and according to published guides from the Office of the Comptroller General (OCG) is being used extensively to decide what programs and which aspects are 'evaluable'. A task force on program evaluability was established by the OCG (prior to 1978) to identify a list of programs and program components which were "evaluable."[33] Internal memoranda on the subject use the very same terminology which Wholey and Rutman have used throughout

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[32] Tom E. Lawson, Formative Instructional Product Evaluation: Instruments and Strategies (Englewood Cliffs, NJ: Educational Technology Publications, 1974), p. 1.

[33] For instance, the Anik-B satellite experiments, as a total package, were evaluated using the framework provided by Rutman and his colleagues.

their publications. [34]

A Multitude of Evaluation Approaches

No standard theory or set of methods is at the root of evaluation practice. Practice is often borrowed from (1) one of the social science fields which has fostered evaluation practice as one of its methodologies for experimentation: for example, education, psychology, management, and political science, and (2) from the professions of medicine, engineering and social work. A wide range of practice exists, which has lately been expanded to include such diverse fields as counselling (see Wheeler and Loesch 1981) art criticism, anthropology, and journalism. (Smith 1981, Parlett and Hamilton, 1972).

House,[35] Perkins [36] and Roos [37] have provided classifications which group evaluation models and purposes. A particularly useful taxonomy is provided by House, because he indicates not only the methodologies and their outcomes, but the assumptions as well. Trans-disciplinary in nature, evaluation has borrowed heavily from the field of education for the

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[34] Leonard Rutman, Planning Useful Evaluations: Evaluability Assessment (Beverly Hills: Sage Publications, 1980).

[35] House, Evaluating with Validity.

[36] D.N.T. Perkins, "Evaluating Social Interventions: A Conceptual Schema," Evaluation Quarterly 1(1977):639-655.

[37] Narolou P. Roos, "Evaluating Health Programs: Where do we Find the Data?" Journal of Community Health 1(1975):39-53.

technology of test measurement, from psychology for the controlled experiment, and from other social sciences for applied research techniques (Parlett and Hamilton 1972). In medicine, the "clinical trial" or the medical audit is often the guiding paradigm. [38]

Sometimes the methodologies evaluation practitioners describe and use relate concretely to the context or to the field, discipline, or area of human endeavour being evaluated. Hence, a quantity of literature has emerged on the subject of educational evaluation. A significant body of literature also exists which is concerned directly with the evaluation of medical interventions and health programs (Shortell and Richardson, 1978). Finally, a shorter list has emerged which describes methodologies and actual case histories for evaluating management and administration, the legal process, and community planning. These fields and contexts have contributed to the array of new methods for both collecting and reporting evaluation information.

The methodologies used for program evaluation serve to emphasize marked differences existing in the orientation and perspective of each evaluator. These differences have fueled debates around the merits or demerits of each approach. Lately the debates have shifted to more fundamental ground. Larger questions have come to light: questions which centre around the

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[38] David L. Sackett, "Evaluation of Health Services" in Maxcy Rosenau Public Health and Preventative Medecine, ed. J. Last (New York: Appleton-Century Crofts, 1980), pp. 1800-1823.

ethics of evaluation research; the role values play in selection of evaluation procedures (Apple 1974, Brookfield, 1984, Gorry and Goodrich, 1978, Jackson 1974, and Paulston 1979), and in the use of results; the role of politics in program evaluation, and the noticeable lack of theoretical orientation in much of what passes for acceptable evaluation research and practice.

A brief review of this literature shows that most practitioners seek to extricate themselves from the problem of paradigm conflict by offering yet another method, measure, or procedure, to replace the particular methodologies or models under attack.

Out of this literature review, then, we can distinguish three types of evaluators. First, those who favor the evaluation research experimental paradigms described above. A number of these proponents have already been listed in this review (for example, Rossi and Wright, Campbell, and Rutman). To this list can be added Cook and Reichardt (1980) and selected authors in the reviews provided by Caro (1977) and Struenig and Guttentag (1975).

Secondly we have those evaluators who favor naturalistic approaches: Apple, Smith, Hamilton and Parlett have already been mentioned in this chapter. Particularly useful is the treatment of the subject complete with methodologies and their underlying perspectives, offered by Patton (1980). Patton classified a number of methodologies under the umbrella of the 'natural science' paradigm, as opposed to the dominant

'hypothetico-deductive' paradigm which is characterized by an emphasis on experimentation, statistics and tests. Parlett and Hamilton, along with Patton, have labelled this hypothetico-deductive approach as the 'classical' or agricultural-botany paradigm.

In the words of Patton:

> "Evaluation research is dominated by the largely unquestioned natural science paradigm of hypothetico-deductive methodology. This dominant paradigm assumes quantitative measurement, experimental design, and multivariate, parametric statistical analysis to be the epitome of 'good' science. This basic model for conducting evaluation research comes from the tradition of experimentation in agriculture, which gave us many of the basic statistical and experimental techniques most widely used in evaluation research. . . ." [39]

A third group of evaluators draws resources from both the quantitative and qualitative paradigms. This group favors multiple approaches. Sometimes the combination of techniques permit more or less continuous gathering of data over a long period of time. Conflicting and opposing views may enter into the report. A principle difference is often the absence of measurements pre- and post-treatment (or program), and the relatively goal-free approach to the assessment. Stake's responsive model and Rippey's transactional model are both examples. Multiple approaches may not serve to widen perspectives, however, for they may simply emerge from the same methodological or ideological framework. For example, Dunn,

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[39] Michael Quinn Patton, Qualitative Evaluation Methods (Beverly Hills: Sage Publications, 1980)

Mitroff, and Deutsch (1981) suggested a multiple triangulation method, but remain in the scientific quantitative paradigm throughout. Similarly, Campbell suggested combining "common sense qualitative knowing" and the quantitative procedural approach but argued from the point of view of the scientist committed to the pre- and post-measurement paradigm. [40]

Others have fostered multiple approaches which allow for the expression of multiple perspectives. Stake's model is an important forerunner for it involves multiple inputs from several 'audiences' and program participant groups. [41] Paulston (1979) and Guba and Lincoln (1981) both follow Stake's model by describing and incorporating an expanded role for 'stakeholders': persons who have a 'stake' or an interest in a program. Rippey's transactional evaluation also incorporates several methods to allow for the emergence of multiple views. [42]

Because evaluators now realize that particular evaluation methodologies 'trap' and label the practitioner into a specific procedural approach, some writers have sought to separate the paradigm from practice (Reichardt and Cook). [43] Others (Paulston

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[40] Thomas Cook and C.S. Reichardt, eds. Qualitative and Quantitative Methods in Evaluation Research. (Beverly Hills, CA: Sage Publications, 1979).

[41] Guba and Lincoln give an excellent description and analysis of this model.

[42] Robert M. Rippey, Studies in Transactional Evaluation (Chicago: University of Illinios, 1973), pp. 1-66.

[43] Charles S. Reichardt and Thomas D. Cook "Paradigms Lost: Some thoughts on Choosing Methods in Evaluation Research." Evaluation and Program Planning 3:1(1980): 229-336.

and House, for example) have attacked the paradigm issue head on, making no claim that it is possible to extricate evaluator bias from the evaluation study through a more 'objective' method. They believe along with Diener and Crandall that "even rigorous methodology cannot guarantee an absence of bias and value influence." [44]

Because of the differences in ideologies, and the conflicting views which emerge in evaluation research, several writers have proposed a kind of adversarial method for evaluation, thereby allowing the conflicting perspectives to emerge. Rippey, Paulston, House, Dunn, Mitroff and Deutsch have all discussed the role of conflicting views which emerge in evaluation, and have stressed the need to recognize multiple ideological orientations to evaluation as well as multiple research paradigms.

In spite of the array of methodologies available, and despite the debates, the so-called hypothetico-deductive models and their experimental and quasi-experimental methodologies continue to hold great appeal. These methods have found favour with officials, especially those government officials whose roles relate closely or are involved with accrediting, auditing and accounting functions, where, according to Smith, the character of the assessment procedures are such as to place great reliance upon quantification, to increase the

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[44] Edward Diener and Rick Crandall Ethics in Social Behavior Research (Chicago: University of Chicago, 1978).

replicability of the results. [45]

In the following section, the history of the adoption and legitimization of evaluation in the US and then in the Canadian federal government is traced. The implications and the consequences of legitimization are indicated, leading to the third and final section of the chapter which discusses the criticism of evaluation.

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[45] Nick L. Smith, (ed). Communication Strategies in Evaluation (Beverly Hills: Sage Publications, 1982).

II. Part Two: Legitimization of Program Evaluation

History

Various authors point out that two sets of forces gave impetus to the legitimization of program evaluation in government. The two sets roughly correspond to liberalism and conservatism. Liberalism produced increased spending during the Great Society of the mid-sixties when numerous innovative programs were implemented. [46] PE gained in popularity as high expectations According to Rutman, were held for these programs. Evaluation was also built into some of the undertakings. [47] Evaluation, as it turned out, became yet another avenue for increased government spending through grants and contracts to evaluation groups and university-based researchers. Evaluation functions were established in many government departments.

Conservatism, on the other hand, sought to tighten the purse strings, show 'value for money' and use evaluation as an accountability tool (Rogers 1979). As Meyers has suggested, "the general antibureaucratic sentiment, and...the growing conservative sentiment in the US... have contributed to the

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[46] Including those programs which eventually led to the satellite experiments for educational and medical use.

[47] Rutman, Evaluation Research Methods, p. .

growth of the evaluation movement." "Evaluation is one way to apply conservative, businesslike realism in order to abolish programs." [48]

According to Caro (1977) and Guba and Lincoln(1981) perhaps the earliest educational evaluation study ever reported was that conducted in 1897 by an educator named Rice. It was Ralph W. Tyler, however, who introduced and popularized the concept of objectives, a concept so central to the practice of evaluation that many evaluators cannot separate evaluation from the setting and measurement of goals.

As an educational tool, the setting of objectives "represented a distinct advance over the pupil-centred, measurement-directed approaches that had been in common use." [49] Tyler's rationale allowed for planning and for curriculum and teacher improvement through the logical application of a series of steps whereby students could express 'behaviours' stipulated by the objectives, and instruments were developed to test each objective. Introduced in 1949, the appeal of this elegant procedure has endured to this day, and is at the basis of much of the evaluation rationale.

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[48] Meyers, Evaluating Enterprise, p. 7

[49] Guba and Lincoln, Effective Evaluation, p. 5.

U.S. Experience

The history of the legitimization of program evaluation is often attributed to the Head Start program which was initiated in 1965 by the Office of Economic Opportunity. The program was designed to prepare disadvantaged preschool children to function adequately in school. It was funded for seventeen million dollars at the beginning, but by 1968 the budget had expanded to three hundred and twenty-three million dollars. (Rossi and Wright, 1977).

According to Guba and Lincoln,

> "Taking office in 1969, the Nixon administration wanted to cut programs to save money. The new administration immediately showed a strong interest in evaluation . . . The Nixon administration pressed for early release of the Westinghouse-Ohio University Head Start evaluation, a program the administration wanted to discontinue. . ." [50]

However,according to a review edited by Cronbach and Ross, the demand for formal evaluations that sprang up in the 1960s

> "...was a product of the period's dramatic expansion of social services and proposals for services, but,. . . . the demand did not come primarily from tightfisted conservatives. It was Robert McNamara who introduced 'program budgeting'. .. . Francis Keppel and John Gardner who launched the National Assessment of Educational Programs, and Robert Kennedy added a requirement for evidence of behavioral change to Title I of the Elementary and Secondary Educational Act. . ." [51]

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[50] Guba and Lincoln, Effective Evaluation. p. 5.

[51] Lee Ross and Lee J. Cronbach, (eds). "Essay Review of The Handbook of Evaluation Research" in Educational Researcher 10(November 1976):9-19.

In tracing the history of one of the favored approaches to evaluation at the time, that is, the systems analysis approach, House states that:

> "... systems analysis. . . has served as the major evaluation perspective in the Department of Health Education and Welfare since about 1965. In that year, President Johnson expanded the Planning, Programming and Budgeting System (PPBS) throughout the federal government. Under HEW secretary John Gardner, a new office entitled the Assistant Secretary for Program Evaluation (ASPE) was created. To fill this office, a group of economists and accountants headed by William Gorham, who had extensive experience with PPBS in the Department of Defense, was brought in. Gorham's deputies were Robert Grosse and Alice Rivlin, who later became Assistant Secretary and head of the Congressional Budget Office." [52]

Alice Rivlin, with Michael Timpane (1975) later provided a retrospective of the Head Start and Follow-Through assessments. Cohen (1975) has also provided an overview of some of the issues and questions which emerged as a result of these social experiments.

Other writers (e.g., Rossi and Wright, 1977) have placed particular importance on the Coleman Report as the originating point for large-scale legalized evaluations in the US. Coleman headed a research team to study the impact of school quality on educational achievement. Four thousand public schools were selected for review. [53] Both the Head Start Evaluation (Evans

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[52] House, Evaluating with Validity, p. 2.

[53] James S. Coleman et al. Equality of Educational Opportunity (Washington, DC: U.S. Government Printing Office, 1969).

1969) [54] and the Coleman Report were reanalyzed and criticized for methodological weakness, but both had an impact on their audiences and sponsors. Weiss (1970) thought the Coleman Report in particular "had an influence on the formation of educational policy" in the US. [55]

Between 1967 and 1972, the US congress passed twenty-three acts requiring evaluation of federal programs, and since 1972 all federal executive departments are required to conduct program evaluations (Meyers, citing Wortman). In 1977 the Office of Management and Budget (OMB) completed a survey of resources committed to program evaluation. Two hundred and forty three million dollars were expended (including salaries for twenty-one hundred professionals). In spite of this significant outlay of resources, however, there is some documented evidence that results have not had the expected impact. [56] Alkin, Daillak and White (1979) in their study of evaluation utilization identified a mixed pattern of utilization of results but they emphasized that looking for "dramatic evidence" yields a non-utilization picture because change is incremental in their view.

In Canada as well, program evaluation activity is not declining, as disclosed through the following review.

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[54] In Caro, Readings, pp. 348-354.

[55] Carol H. Weiss, "The Politicisation of Evaluative Research," Journal of Social Issues 26(1970):57-68.

[56] Abt, Evaluation of Social Programs, pp.37-47.

Legitimization of PE in Canada

There is no doubt that the US program evaluation experience influenced and charted the course of events for the Canadian federal government. The official Guide on the Program Evaluation Function states clearly that "PE has been an identifiable activity for the last 15-20 years, with much of the efforts being carried out in the U.S. The experiences gained there, elsewhere, and in Canada, have been valuable in developing the approach outlined in these guidelines." [57]

According to an OCG paper on PE, the increased concern with the purposes and hence the results of government expenditures can be traced to the 1960 Royal Commission on Government Organisation (The Glassco Commission) which published a first of several volumes in 1962. The massive reorganization suggested by Glassco introduced a wave of modernism at all levels of the Canadian federal government. The aim was the overall improvement of the machinery of government, but an emphasis on decentralisation actually weakened the lines of accountability. [58]

The wave of reform introduced by Glassco was followed by another wave, one to accompany a climate of fiscal restraint, where "efficiency, economy, and improved service in government

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[57] Government of Canada, Office of Comptroller General, Guide on Program Evaluation Function, p. 4.

[58] Government of Canada, Ministry of Supply and Services, Royal Commission on Financial Managemnt and Accountability Final Report, March 1979, p. 24.

programs" was to be improved. [59] Systems adopted included the Planning Programming and Budgeting System (PPBS) (1966), a program which had been introduced in the US pentagon around this time, the techniques for Management by Objectives (MBO) (1970), the Benefit Cost analysis System (1973), the Improvement of Management Practices and Controls (IMPAC) (1978), the Study of Procedures in Cost Effectiveness (SPICE), and the introduction of program evaluation are all direct descendants of Glassco efforts to modernize government.

According to Dobell and Zussman, (1981) [60] one of the earliest references to PE in the Canadian government was heard in a speech made in the House of Commons by C.M. Drury in June 1970. He stated "what is required, and what has been lacking, is a continuing program of evaluation. . ." [61] According to French, (1980), Douglas Hartle, a University of Toronto economist who came to Ottawa (as deputy-secretary, Planning and Treasury Board) in 1970 to revamp the Treasury Planning System, was one of the early proponents of program evaluation in Canadian government.

> "Hartle was always ready to articulate the benefits of a more systematic and quantitative approach to planning and evaluation. His ideas achieved wide exposure in the bureaucracy in the early seventies." [62]

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[59] Ibid.

[60] Doern and Maslove, Public Evaluation, p. 420.

[61] Government of Canada, House of Commons Debates, Hansard, 7858 [June 8, 1980.]

[62] Richard French, How Ottawa Decides (Toronto: James Lorimer & Co., 1980)

But Hartle's planning ideas did not survive in their original form. Although Hartle was himself instrumental in carrying out a number of reviews of the 'effectiveness' of government-sponsored social programs, he could not have the program evaluation idea accepted wholeheartedly by decision makers at the ministerial level. (French, 1980).

Speaking before the Canadian Medical Research Council in 1972 on the subject of research, Hartle stated:

> "...I have observed that practice lags seriously behind theory. It seems to take decades to put a new idea into effect. Indeed some good ideas are never implemented. . . existing institutional arrangements are extraordinarily difficult to change because they usually bestow gains and losses in prestige and/or income on those involved and hence lead to a kind of warfare between potential winners and losers that often results in stalemate." [63]

He might well have been referring to the Canadian government experience with program evaluation.

The Glassco Commission reforms did not solve all the problems of modern government. In particular, there were problems still evident in management and accountability, in some ways made more difficult by the decentralization emphasis which Glassco proposed. The Royal Commission on Financial Management and Accountability was set up in 1976. As part of its mandate it was to report on "the management system required" and the "structure, organization, or process" needed for "financial

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[63] D.G. Hartle, "MRC Research Viewed as Public Investment," MRC Newsletter 2(1972):7

management and control." [64]

Shortly afterwards, the government's policy on program evaluation was promulgated by the Treasury Board in September 1977. The general statement of the policy states: "Departments and agencies of the federal government will periodically review their programs to evaluate their effectiveness in meeting their objectives and the efficiency with which they are being administered." [65]

One year later, the Auditor General in his Study of Procedures in Cost Effectiveness (SPICE) reported that, of thirty-five studies of selected aspects of management in government departments, twenty-three programs in eighteen departments had not conducted evaluations or had produced evaluations of poor quality. The auditor general remarked:

> "I have observed a mystique that surrounds the question of evaluating program outcomes. Many see program evaluation as complex, esoteric and difficult, if not impossible. In plain language, we are talking about the information managers should have at their fingertips concerning the accomplishments of government programs." [66]

In 1979, the Lambert Commission rendered its final report which contains this comment: "Virtually no effort has been made to establish clearly defined objectives which the performance of

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[64] Government of Canada, Canada, Royal Commission on Financial Management, pp. 6-7.

[65] Government of Canada, Canada, Treasury Board, Policy Circular 1977-47.

[66] Canada, Office of the Auditor General, Study of Procedures in Cost Effectiveness: Extracts from the 100th Annual Report of the Auditor General of Canada, 1978, p. 4.

a department or agency can be measured either in total or in respect of particular programs or activities." [67] In 1981, Dobell and Zussman said:

> "...Now in 1981, the federal government is still at the beginning of a new round [of reforms] with assurances that twelve departments out of 58 agencies and departments covered by TB 77-47 have adequate evaluation functions, and six are working toward that goal with plans acceptable to the office of the Comptroller General." [68]

No one in the public sector, whatever the level, program or department, seems to have embraced the idea of program evaluation with glee. Perhaps, as Doern and Maslove (1978) suggest, there is lack of incentive for the use of evaluation by parliamentary institutions.

> "This is especially the case in the Canadian House of Commons where the strength of partisan political norms, party discipline, and adherence to the view of Parliament as a gladiatorial struggle create at best only a selective interest in evaluation." [69]

Perhaps the word evaluation conjures up fears of tests which even the most carefully nurtured and cherished programs and institutions will fail: "Governments and agencies derive their support, strength and significance from programs." [70] More generally,

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[67] Royal Commission on Financial Management.

[68] Rodney Dobell and David Zussman, "An Evaluation System for Government: If Politics Is Theatre, Then Evaluation Is (Mostly) Art," Canadian Public Administration 24(Fall 1981):404-427.

[69] G. Bruce Doern and Allan M. Maslove, eds. The Public Evaluation of Government Spending (Montreal: Institute for Research on Public Policy, 1979), p. 5.

[70] Ibid., p. 6.

> "People and their representatives generally want two incompatible things: more state services (which cost money) and lower taxes. Greater efficiency in the use of resources will not reconcile these objectives. Up to a point people accept this, and, so long as they do, control over expenditure in a democracy will be weak."[71]

In the view of many of the writings reviewed, however, the many problems with the concept and practice of evaluation itself are the cause of the disenchantment and the nonutilization. In the section which follows, these criticisms are reviewed and summarized.

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[71] Ibid.

III. Part Three: Background to Critical Literature

In 1972, Parlett and Hamilton wrote:

> "As a new field, program evaluation has encountered a wide range of problems both theoretical and methodological. . . confusion is engendered as rival proposals, models and terminologies are voiced and then rapidly countered. As a developing field of study, evaluation proceeds in the absence of coherent or agreed frames of reference." [72]

More recently, Dunn, Mitroff and Deutsch (1981) thought the "enterprise of evaluation is a messy, squishy, or ill-structured problem" where researchers "have uncritically adopted implicit decision rules and underlying assumptions." [73]

Every aspect of program evaluation, from the inadequacy of theoretical basis, to the choosing of which program will be evaluated, from the problems associated with methodologies (Weiss and Rein, 1969, Cronbach, 1980), to the issues associated with values and ideological orientation (see below), to the misuse, use, or non-use of results (Nielsen 1975), has been subject to criticism at one time or another. No aspect of program evaluation has been spared.

In the previous two sections of this chapter, some of the critical comment has been introduced. In this current section,

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[72] D. Hamilton et al Beyond the Numbers Game (London: MacMillan, 1977) p.17.

[73] Wm. Dunn et al "the Obsolescence of Evaluation Research." Evaluation and Program Planning 4:(1981) p. 208.

selections from the critical literature are reviewed under headings which introduce the value context, the political context, the question of use of program evaluation results, and the lack of theoretical orientation in evaluation.

The Context of Value in Evaluation

In practice, evaluation research resembles closely other kinds of science research and experimentation, and is therefore subject to similar payoffs and pitfalls. [74] There is one notable difference, however, as several of the authors reviewed point out, for example, Gorry and Goodrich [75] Apple [76] and Paulston. [77] This difference lies in the underlying value perspective imbedded in the practice of evaluation. It can be argued that all social experimentation is undertaken because one considers the experiment to be "valuable", and that each scientist brings

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[74] John Brynner, " Experimentatal Strategy and Evaluation Research Designs," British Educational Research Journal 6(1980):7-19.

[75] Anthony G. Gorry and Thelma Jean Goodrich, "On the Role of Values in Program Evaluation," Evaluation Quarterly 2(1978):561-572.

[76] M.W. Apple, M.J. Subkoviak, and H.S. Lufler, Educational Evaluation: Analysis and Responsibility (Berkeley, CA: McCutchan,1974).

[77] R.G. Paulston, Paradigm Conflict in the Assessment of Educational Reform: Evaluation as Social Critique ERIC (Microfiche). 1979.

to that research endeavour his/her own value structure. [78]

In evaluation, the concept of valuing is more central: it is the 'raison d'etre' of the activity. Hence, whether the methodology is classified as 'research' or not matters little to the act of evaluation itself, for "To evaluate something is to work out its value." [79] Paulston (1979) and House (1981) discuss how the choice of an evaluation approach itself is linked to the investigator's own bias. "In evaluation, value positions dictate which goals, strategies and methods are to be considered the most desirable..."[80] According to Paulston, "the evaluator is seen as an integral part of the research act. His task is to present explanations derived from individuals' accounts of their own and collective behavior." [81]

Both the sponsor and the evaluator express their value judgements in the commissioning and carrying out of an evaluation study, through the choices they make. Abert (1979) asks, in his review of HEW (US) evaluations:

> "As with the operating programs of HEW, those who deliver health, education and welfare programs to recipients, management of an evaluation program of 40 million plus also involves choices. What is to be evaluated, who should do it, and to whom should they report? Not all of this seems to have been clearly

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[78] See, for example, Edward Diener and Rick Crandall, Ethics in Social Behavioral Research (Chicago: University of Chicago Press, 1978).

[79] Royal Commission on Financial Management, p. 598.

[80] R.G. Paulston, Paradigm Conflict in the Assessment of Educational Reform: Evaluation as Social Critique p. 28.

[81] Ibid.

appreciated at the outset." [82]

The notion of choice also enters the evaluation picture because the evaluator in fact selects a portion of reality which he or she will scrutinize, and, depending on methodology, this examination may force exclusion of other portions. This choice attaches importance to the portion of the program, or the reality, which is examined and assessed. In human service programs, this selectivity is managed through the setting of goals, which in themselves announce the worth or merit of some aspect. The preoccupation with goals has been dealt with by a number of mainstream evaluators. Scriven sought to develop a goal-free model for evaluation, which has been disputed in an ongoing debate. [83] Other than the goal trap, there is also the problem of variable selection, of the identification of causal linkages. As Jordan and Sutherland put it:

> "the most-used multivariate analysis techniques require that the causal factors are related to the effect, but not to each other. But in the world almost everything is related to everything else."[84]

Similarly, House (1980) thought that neither the perceptions nor the object perceived exist independently of a life situation, for the situation is a transaction.

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[82] James Abert, ed. Program Evaluation at HEW, vol. 1 (New York: Marcel Dekker Inc., 1979), pp.3-76.

[83] W. James Popham, ed. Evaluation in Education: Current Applications (Berkely, CA: McCutchan, 1974).

[84] J.M. Jordan and S.L. Sutherland, "Assessing the Results of Public Expenditure: Program Evaluation in the Canadian Federal Government." Can. Pub. Admin 22:(Winter 1979) p. 603.

The evaluator working on a contract basis is however often forced to choose the methodology,and the program aspect to be studied, as dictated by the mainstream political and ideological thought of the day.

Certain evaluation reporting styles which give full play to the role of values, for instance the case study approach, have not been taken seriously because of the difficulties encountered in translating complex analyses in terms succinct enough for the decision maker to use. Very often the terms preferred by managers and decisionmakers are the elegant and simple quantitative ones. Even the language or method used for communicating the results of an evaluation study can be value-laden. Reardon, for example, (1977) [85] has dealt with the problem of communicating evaluation results in terms of the jargon used in the reports.

In his most recent collection of novel approaches and techniques for evaluation, Smith (1982a) has proposed an entirely different list of ways in which one can present program data: ranging from the journalistic to the artistic to the photographic. Again, values are represented in the editing and presenting of materials, for one must be selective.

In short the notion of value enters the evaluation paradigm at all levels: it is patent in the selection of criteria, methods, evaluator, procedures, reporting style, and

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[85] D.F. Reardon, "A Model for Communicating About Program Evaluation" Journal of Community Psychology 5(1977):350-358.

sponsorship. More than this, evaluation, as authors House and Paulston have emphasized, is linked to the ideological and political forces which produce the programs and their products. Evaluators and their methodologies are sometimes symbiotically linked within the same system, as Meyers (1981) and others have suggested. This linkup sometimes leads to conflict, sometimes to advocacy, but rarely to consensus or congruence in appreciation of the meanings and the implications of an evaluation study.

The Political Context

In terms of the politicization of evaluation, the degree and volume of criticism have been on the increase since the mid-seventies, no doubt because of the increasingly important role played by governments in making program evaluation a requirement or a policy. The political context has therefore been featured somewhat more prominently in recent writings. Jordan and Sutherland (1979), after comparing the role of program evaluation in various countries including Canada, thought "Evaluation is as much a political device as a tool of social sciences." [86] House(1980) was also concerned with the political nature of evaluation: "Evaluation is by its nature a political activity. It serves decision makers, results in

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[86] Jordan and Sutherland, "Assessing Results of Public Expenditure", p 585.

reallocations of resources, and legitimizes who gets what." [87]

Similarly, Weiss (1970) wrote that "Evaluation has always had political overtones. It is designed to yield conclusions about the worth of programs and, in so doing, is intended to affect the allocation of resources." [88] Pointing out that, as government spends a growing amount on program evaluation, it also exercises a growing degree of control on the specifications, objectives and time lines for these studies:

> "Government agencies may seek only to enforce. . . . research quality, but they almost inevitably become suspect of political pressure, pressure to vindicate the program and justify the budget. The agency retains, after all, the authority to cut off the study in the middle if 'progress' is 'poor'." [89]

The political pressure can also be brought to bear in an opposite way, however. In a reanalysis of the Head Start program evaluation, it has been suggested that the study was rushed because the Nixon administration wanted to end the program (Guba and Lincoln, 1980). Writing about the conservatism of more recent times, Freeman and Solomon (1981) commented that the evaluation activities of the 80's will reflect the changing mood away from social experimentation (where evaluations were used to bolster support for programs) towards a more tight-fisted view of reality. As such the Sunset Law approach will prevail, and the emphasis will move from what was previously an emphasis on

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[87] House, Evaluating with Validity, p. 121

[88] C.H. Weiss, "The Politicisation of Evaluative Research", Journal of Social Issues 26(1970):57-68.

[89] Ibid.

identifying new programs that worked to one which will identify established programs that do not work, according to Freeman and Solomon (1981).[90]

The Canadian government experience with program evaluation is not as considerable compared to that of the US. For instance, there has been little by way of public debate or disagreement over program evaluation studies. The silence which surrounds the publication of evaluation studies in Canada may be due to the fact that few such studies have been made public, or that few studies of any significance have indeed been carried out. [91]

Since little is known (and even less appears to be done) concerning the results of evaluation studies, a closer examination of the linkages between program evaluation results and their utilization by decision makers ought to be made.

Utilization of Program Evaluation Results

Closely allied to the political context of evaluation then, is the question of how evaluation results are used, if at all. Abt (1979) lists a number of difficulties in producing and using research results, generally. Policy lags behind for a number of reasons, notably the availability of the information at the

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[90] Howard E. Freemand and Marian A. Solomon, "Evaluation and the Uncertain 80's," Evaluation Studies Review Annual vol. 6 (Beverly Hills: Sage Publications, 1981).

[91] In certain government departments, there is a mood that prevails concerning evaluation results: that they do not really matter: nothing changes: everything goes on as before.

right time and in the right format.

In their study on how decisionmakers perceive the work of social scientists and use the results in decision making, Weiss and Bucuvales made the basic point that research is ignored by government as a basis for decisions in spite of the fact that governments spend great sums of money for research. They thought that if social scientists knew the "factors that govern officials' acceptance of research, investigators who want to increase the influence of their studies can fashion them in ways calculated to meet prevailing expectations." [92] They also thought that research could be used more widely and profitably but "looking outward at the intersection of research and agency decision making, we find that the road to application is by no means a royal highway." [93]

The authors looked at various coupling systems between social science research and government decision making, and located various sources of discontinuity. They also located a number of constrictions to the flow of information about research activities. They called "particular attention to the need for understanding the multiple frames of reference with which people perceive knowledge."[94]

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[92] C.H. Weiss and M.J. Bucuvales, Social Science And Decision-Making (New York: Columbia University Press, 1980).

[93] Ibid., p. 16.

[94] Ibid.

The authors acknowledge that there are many definitions of use and so, in their survey, they used the officials own judgement regarding the usefulness of research. They found that decisionmakers screen research results through a series of implicit filters which leads to rejection or acceptance of results. Officials viewed as useful those research studies with high technical standards. However, in a review of two hundred and fifty-six evaluation studies done by Bernstein and Freeman, only twenty per cent of them were judged to be of 'high quality'.

Nielsen (1975) [95] found that evaluators monitor the long range outcomes of program policies rather than the direct impacts of programs, and "generally compile hard data" whereas managers place emphasis on causal relationships within a program rather than the program's total impact.

The Lack of Theory

In the first section of this chapter, a review of some of the methdological debates was presented. It has been argued by several evaluation critics in particular Zucker (1977), that the evaluation debates have focussed almost exclusively on methodological issues, "de-emphasizing the quality of the end

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[95] Victor G. Nielsen, "Why Evaluation does not Improve Program Effectiveness" Policy Studies Journal 3(1975):385-390.

product." [96]

Methodology should not be the sole criterion for quality in research, according to Zucker, yet most view evaluation as primarily methodological.

> "The adequacy of theoretical frameworks used in developing the research design is generally considered much less important, though on reflection most would agree that it is a much more crucial determinant of the information value that the results of the evaluation will have. At a minimum, an adequate theoretical framework should produce knowledge that is comparative and cumulative. Not surprisingly, given the methodological emphasis, it appears that adequate theoretical frameworks are seldom used in evaluation research." [97]

Whatever theoretical frameworks are used in evaluation studies are often weak and of 'low generality', according to Zucker. Guba and Lincoln (1980), however, like Cronbach, suggest that generalizations decay over time, and in due course, become more historical than scientific in importance. This is especially true in evaluation where human behaviour is heavily mediated by the context in which it occurs.

A useful source for a theoretical perspective has been suggested by Guba and Lincoln (1981). Following an extensive review of the current program evaluation debates, they suggest (as does Zucker) that the methodological debates have masked the real issues. Their treatise shifts the focus away from technical questions and methodological arguments by suggesting that the

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[96] Lynne G. Zucker, "Evaluating Evaluation Research: Standards for Judging Research Quality," Sociological Practice 2(1977):116.

[97] Ibid.

provision of an appropriate theoretical perspective is required to provide a solid basis to the field of evaluation and lend credibility to individual findings. However, a preoccupation with testing theory can constrain emergent findings in program evaluation. They conclude that grounded theory research, since it allows for the use of multiple methodologies, both qualitative and quantitative, places the emphasis on theory rather than on method. As well, because the theory can emerge in the course of field research, few constraints are placed on emerging data. Finally, because grounded theory presents these advantages, the perspective can

> "meet two criteria, 'fit' to empirical situations and meaningful communication with both professionals and laymen, better than do 'a priori' theories, while also serving all the usual functions of theory: prediction, explanation, . . . grounded theory offers a more solid and reliable base. . . ." [98]

Guba and Lincoln also suggest that the grounded theory approach be combined with other methodologies. For example, an approach called 'response evaluation' which was developed by Stake (1977) can be combined successfully with grounded theory for effective evaluation.

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[98] Guba and Lincoln, Effective Evaluation, p. 68.

The Evaluation of Telecommunications Technology

Since the main context of this study is that provided by telecommunications technologies in the health care field, the literature specific to these evaluations is reviewed in the course of the first case study, in Chapter Three. The writings of Conrath and Dunn, Casey-Stahmer, and others will be reviewed. These writers actually documented evaluation studies of telemedicine projects, and their assessments and reports form the core of material reviewed for the first case study.

It should be noted that from the vast amount of material available about program evaluation, as we have indicated in this chapter, little has been written concerning the evaluation of innovations, or specifically, the evaluation of telecommunications technology projects.

IV. Summary

This chapter has outlined, in broad strokes, a background to program evaluation using selected readings to inform a review of the main approaches, the history of legitimization of program evaluation, the debates and the criticism. This review has shown that, from an extremely wide collection of materials, a variety of debate and paradigm conflict has emerged. Yet, this has not deterred decisionmakers from promoting the evaluation paradigm through the process of accountability. The history of legitimization of program evaluation in the US and Canadian governments was reviewed.

The debates have produced newer models and a proliferation of methods but few studies seem to have included substantial theoretical perspectives in their approach. The chapter has concluded on this and other critical notes. The role of politics and values and the question of use and non-use of evaluation results were also reviewed through the writings of selected evaluation practitioners.

C. Chapter Three: Canadian Telemedicine Via Satellite: A Case Study

I. Part One: Introduction

This chapter consists of study of the Canadian telemedicine projects using the satellites Hermes and Anik-B as the principal communications link. The time span stretches from 1972 when planning for the Hermes experiments took place, through to 1982, when the final evaluation report was received for the Anik-B experiments. The main purpose of this chapter is to provide a reassessment of the telemedicine experiments or projects through information gathered from a variety of sources: project reports, interviews, site visits and proceedings from conferences and debriefing sessions. This case study and its reassessment are used to provide further understanding of the complexities involved when new telecommunications systems are introduced in the health care sector.

The chapter is divided into two parts. Part one contains a description of the methodology and the historical background, from the history of telemedicine itself, to a brief overview of satellite use for social experimentation. Part two is the study itself, which is concentrated on the evaluation reports and results of the Canadian telemedicine projects which used the communication satellites Hermes and Anik-B. In this part of the chapter a re-examination of the project literature provides a retrospective view of the evaluation perspectives, methodologies and results. The chief objective of the reassessment is to shed

new light on some of the issues and problems which did not emerge in the original reports and accounts of of the experiments and projects.

Methodology

The methodology used for this retrospective study is adapted from Stake's "Case Study Method in Social Inquiry."

Stake defined the case as any bounded system. "An institution, a program, a responsibility, a collection or a population can be the case." In this chapter, the case consists of all Canadian satellite telemedicine projects and their evaluations. Stake pointed out that case studies are exploratory and preliminary to theory development, "more suited to expansionist than reductionist pursuits . . ." [1]

Although the case study has been useful in theory building," its best use appears . . . to be for adding to existing experience and humanistic understanding." [2] This is the main objective of this study– to add to understanding of the complexities involved in introducing communications technology in the health care sector.

Since a specific focus is the reassessment of the evaluations of telemedicine projects, the case study approach is

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[1] Robert E. Stake, "The Case Study Method in Social Inquiry," Educational Researcher 7(February 1978):5-8.

[2] Ibid.

combined with the tools of meta-evaluation, as described in Chapter One, and proposed by Cook and Gruder. [3] In their review article on meta-evaluation, they echo other writers, (e.g., Glass, [4] Scriven, [5] Walberg and Haertel, [6] and Zucker. [7]) These authors express the general view that meta-evaluation is valuable because it can add weight to a conclusion and produce new insights from a synthesis of information. This type of re-analysis of known research may be far more valuable than the "50th, 100th, or 1000th primary research study." [8]

The term meta-evaluation began to appear in the literature in 1969 when Scriven defined it as "second order evaluation" or "evaluation of evaluation." [9] Similar procedures have been described by the authors listed above to aggregate research findings, to reassess the findings, to reanalyze the role of the procedures for evaluation, to critique the methodologies, or

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[3] Thomas D. Cook and Charles L. Gruder, "Metaevaluation Research," Evaluation Quarterly 2(1978):5-51

[4] G.V. Glass, "Primary, Secondary, and Meta-Analysis of Research," Educational Research 10(1976):3-8.

[5] Michael Scriven, "An Introduction to Meta-Evaluation," Educational Product Report 2(1969):36-38.

[6] H.J. Walberg and E.H. Haertel,"Research Integration: An Introduction and Overview," Evaluation in Education 4(1980):1-142.

[7] Lynne Zucker, "Evaluating Evaluation Research: What are the Standards for Judging Research Quality?" Sociological Practice 2(Fall 1977):107-124.

[8] Everett M. Rogers, "Importance of Meta-Research," ICA Newsletter, 1981.

[9] Scriven, "An Introduction to MetaEvaluation," 36-38.

simply to synthesize the results of a range of studies and gain new insight from the synthesis. The terms meta-research, meta-evaluation, and meta-analysis have been variously applied to such second-order research.

Cook and Gruder described seven models for the re-examination of evaluation studies. The model chosen is a variation of the essay review, which guides an examination of published and unpublished material about the program and its evaluation. Other meta-evaluation models were rejected for this study because (1) primary data was not available for re-manipulation, and (2) this review is being done after the fact, rather than simultaneously with the primary evaluation procedures.

The combination of the case study approach and the meta-review procedures appears at least once in the literature, as described by Ladas, who used the case study as complementary to meta-analysis, stating, "A case study method is suitable when there are too few studies for meta-analysis or when statistical data is inadequate." [10] The current study qualifies on both counts.

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[10] Harold Ladas, "Summarizing Research: A Case Study," Review of Educational Research 50(1980):597-624.

II. Telemedicine History

The roots of telemedicine and telehealth are multiple. If telemedicine is defined simply as medicine practiced at a distance using any channel to extend the human voice, ear, or eye, to deliver and/or receive medical information, then the history of telemedicine goes as far back as 1860, according to Reiser, when the telegraph system was used to carry medical data:

> "A Boston physician, J B Upham, conducted an experiment with a device that translated the heart's motion into currents which he sent over a telegraph wire from Boston to Cambridge, three and a half miles away" [11]

Both Reiser, Cooper and Caceres claim the telephone system was first used for medical diagnosis by Einthoven for the transmission of electrocardiograms (ECGs). Einthoven first used existing telephone lines in 1905 for transmission of ECG tracings over a distance of 1.5 km "from a hospital to his laboratory. In the first year of experimentation, 100 tracings ... were transmitted." [12]

Heart sounds transmitted over the telephone were made possible because of the invention of the microphone, and finally, the electronic sthethoscope in 1910. In 1965, Cooper

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[11] Stanley J. Reiser, Medicine and the Reign of Technology (Cambridge: Cambridge University Press, 1978), p. 200

[12] C.A. Caceres,ed. Biomedical Telemetry (London: Academic Press, 1965),p. 16.

and Caceres [13] wrote that telemetry had not become widely utilized yet, even though most investigators had maintained that telephone telemetry is quite feasible. They gave several reasons which suggested the failure of physicians to take advantage of telephone telemetry including the fact that data does not need to be transferred any faster than by mail service, and that the doctor-patient contact is eliminated.

In suggesting a method for evaluating a telemetry system, Caceres, together with Grisamore [14] described a schema based on Shannon's classic treatise on information transmission. In 1948, Shannon had proposed a linear model based on engineering and mathematical principles for the analysis of a communication system. [15]

It is interesting to note that the review of telemedicine done by Brown over thirty years later, it is suggested that the Shannon model might be appropriate to the assessment of the communication function of a telecommunications service in health care.

It was not until the late 1940s that medical images were reported to have been transmitted over long distances. In 1950, Gershon-Cohen and Cooley used the term telognosis to designate the "roentgenographic diagnosis obtained from facsimiles of

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[13] Caceres, Telemetry, pp. 351-376.

[14] Ibid.

[15] C.E. Shannon, "A Mathematical Theory of Communication," Bell System Technical Journal 27(1948):379-423, as cited by Grisamore et al in Caceres, Telemetry.

original roentgenographs transmitted by radio or telephone wires over short or long distances." [16] A chest x-ray could be transmitted in four and a half minutes. They did not report evaluating their system, but concluded that:

> "We have had sufficient experience with this first experimental model during the past two years to venture the prediction that, if and when this service can be supplied at low enough cost, it will become a useful tool for the small rural hospital in obtaining full-time expert radiologic service for its staff."[17]

As early as 1959, Dr Jutras, a Canadian radiologist, transmitted radiographic images and performed remote control fluoroscopy. [18] The advent of the image amplifier, a device which miniaturizes and intensifies the fluoroscopic image, permitted moving film and video tape recordings to be taken of the fluoroscopic images. The CBC collaborated with Dr Jutras in helping him to transmit live radiology examinations, and to project a first cineradiograph, shown at an international congress in Munich in the early sixties.

In 1959, Dr Jutras wrote an editorial which urged the development of "a special network interconnecting hospitals and

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[16] J. Gershon-Cohen and A.G. Cooley, "Telognosis," Radiology 55(October 1950):582-587.

[17] Ibid.

[18] Fluoroscopy is the examination, by a fluorescent screen, of parts or organs of the body-in-motion. A low-level radiation beam is used. Some years later, one of the Hermes experimenters supervised fluoroscopic examinations done by a non-physician, located at a remote site. The satellite link was used to transmit the image.

physicians." [19] In a live video conference in October of 1980, Jutras shared his dream - which was to have such a system linking all of the hospitals in Quebec.

Park (1974) and Bashshur and Lovett(1977) have divided the US telemedicine history into three eras. The first developmental stage lasted from 1959 to 1972. The first telemedicine link was that established in Omaha (1959) between the Nebraska College of Medicine and the Psychiatric Institute. The two institutions were across the street from each other. They were linked by two-way television for psychiatric consultations and teaching.

Dr. Ken Bird , however, is generally credited with having been the first to coin the term telemedicine, when he instituted a communication link between the Massachusetts General Hospital and the Logan Airport. [20] The communication link was provided by microwave, and one-way television was used to relay diagnostic information from an emergency clinic at the airport. A two-way audio link allowed use of an electronic stethoscope by a non-physician (at the remote location).

In 1969, three Veterans administration hospitals in Nebraska began to use telemedicine links. An interactive transmission between the Bedford Veteren's Administration Hospital and the Massachussetts General Hospital was installed

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[19] A. Jutras, "Teleroentgen Diagnosis by Means of Videotape Recording— Editorial," American Journal of Roentgenology 82:6(1959):1099-1102.

[20] R.L.H. Murphy and Kenneth T. Bird, "Telediagnosis: A New Community Health Resource," American Journal of Public Health 4(1974):113-119.

in 1970.

The second stage of telemedicine history was characterized by more deliberate efforts towards research and demonstration. Park reports that three offices of the federal government initiated ten of eleven new telemedicine projects during 1972-73. Eight new projects were funded by the Health Care Technology Division (now DHEW). [21]

Early Evaluation Efforts

A first conference was held in Hanover, New Hampsire in 1972. None of the eight projects were yet operational, but

> "since evaluation strategies were in varying stages of development an attempt was made, as it would be made in subsequent meetings, to establish clear guidelines for evaluation. Although there was general agreement about the objectives, a precise means of evaluation was not forthcoming for most of the projects...." [22]

A second conference was held in Cambridge in September 1972, and a third in 1973, and by the fourth meeting in 1974, most "utilizers . . . felt that available evaluation methods were inadequate." [23] There were objections by staff to filling out forms, and "gut reactions were considered valid but not

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[21] Ben Park, An Introduction to Telemedicine (New York: New York Centre for Interactive Television Studies, 1974).

[22] Ibid, p. 34.

[23] Ibid.

measurable."[24] This fourth meeting also "brought sizable areas of disagreement between telemedicine practitioners and disinterested observers from social science and systems analysis disciplines." [25] At a fifth meeting in 1973, users attempted to isolate and identify problems of utilization and evaluation.

In this same year, the Department of Medical Care Organization conducted a seminar.

> " The most difficult questions dealt with the social impacts of communications technology on health care and its legality, responsibility, acceptance, efficiency, economics, training, class distinctions, and the most fundamental question of all - 'what constitutes an optimal health care system'?" [26]

According to Bashshur and Lovett,

> "Despite the number of projects and the amount of money expended, the hoped-for definitive conclusions were not obtained. Rather, there were answers to some new questions, while more research was required to find answers for others." [27]

The third stage of telemedicine began around 1973 with active involvement by

> "social scientists and medical care specialists in evaluation of the impact of telemedicine and its comparison to other modes of delivery, and in identification of the problem areas most suitable for its implementation." [28]

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[24] Ibid.

[25] Ibid, p. 36.

[26] Ibid.

[27] Rashid Bashshur and Joseph Lovett, "Assessment of Telemedicine: Results of the Initial Experience," Aviation, Space, and Environmental Medicine 48:1(January 1977):65-70.

[28] Ibid.

In 1976, the authors Bashshur and Lovett surveyed sixteen telemedicine systems in the US, and concluded that the "lack of explicitly stated objectives for demonstration projects and the lack of criteria for measuring outcomes" [29] contributed to a lack of comparative information being available. Moreover they thought that:

> "The relationship of telemedicine systems to the large organization or network of organizations of which they are a part is a very necessary part of the evaluation process. Currently, it is not clear whether the telemedicine system complements, supplements, or is redundant to existing organizational delivery capabilities. Moreover there are no data to indicate if the quality of care via IATV is better, the same as, or worse than, the quality of care delivered by a variety of other modes." [30]

Satellites

The space age began with the celebrated launch of the satellite Sputnik in 1957, followed by the US launch of the Explorer in 1958. In 1962, Canada was the third nation to launch a satellite. It was not until 1976, after the Hermes-CTS satellite had been launched, however, that Canada and the US embarked on satellite telemedicine projects. Some writers (e.g.Reiser 1978), have reported that satellites were used much earlier than this for transfer of medical information. In the early 60s electroencephalograms (EEGs) were sent via Relay 2, an

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[29] Ibid.

[30] Ibid.

American satellite, from the Neurological Institute in Bristol, England to the Mayo Clinic in Minnesota for diagnostic purposes. In 1965, according to Paul, the satellite Early Bird

> "carried a heart operation from Baylor University in Houston more than 5,000 miles to a lecture room in a Geneva hospital. Part of the operation was also broadcast over public television." [31]

In 1966, the Canadian federal government established the crown corporation called the Science Council of Canada and in 1967, commissioned a technical study entitled Upper Atmosphere and Space Programs in Canada which was written by a research team headed by John Chapman. [32] The Science Council's comments to this study are found in its first report A Space Program for Canada. [33] The study was a distillation of one hundred and twelve briefs received and it "attempted to develop a rationale for Canada's position in space activities." [34] The report made no direct reference to proposed social experiments but did propose new uses for satellites, including educational

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[31] Gunther Paul, The Satellite Spin Off (New York: Robert B Luce, 1975).

Such a transmission has been replicated over and over again since this earliest effort. In 1970 the German medical society sponsored a forum which was broadcast from Houston Texas to Davos Switzerland to Bad Gastein. More than 10,000 doctors took part. A similar demonstration took place in August 1981 between Vienna and St John's Newfoundland.

[32] J.H. Chapman et al. "Upper Atmosphere and Space Programs in Canada," Special Study No. 1, Science Secretariat of Privy Council Office, Ottawa, February 1967.

[33] Science Council of Canada, "A Space Program for Canada," Report No. 1, Ottawa, 1967.

[34] Ibid.

television, as well as communication services to remote communities.

The Chapman report made reference to the need for "mission oriented research" and claimed that many of the briefs received raised the issue of "need" for communication satellites in Canada, for "a central Canadian organization for space," and for a "Canadian satellite launching capability." Evaluation is mentioned in the context of the evaluation of proposals for research. The general direction of the report's contents was the reorientation of Canada's space program to a more applied direction.

Early satellite experiments were scientific and technical, rather than social. Thus, Alouette I and II, and ISIS I and II, launched in 1962, '65, '69, and '71 respectively were used to conduct a variety of ionospheric experiments. Telesat, Canada's domestic communication satellite agency, was incorporated in 1969. It was in this same year that the federal department of communications was established. [35]

With the launch of the first of the Anik series satellites in 1972, Canada became the first country to operate a domestic communications system based on a geostationary satellite. [36]

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[35] "Act to Establish the Department of Communications," Revised Statutes of Canada, Vol. 1, chap. c-24 (1970).

[36] W.T. Kerr, "Service Development in Canada Using Communications Satellites," address given at the U.N. Regional Seminar on Remote Sensing Applications and Satellite Communications for Education and Development in Buenos Aires, April 1981.

From their positions some thirty-six thousand km above the equator, the Anik A satellites could 'see' all of Canada and therefore provided the country with the potential for east-west telephone, television and data transmission via satellite.

Hermes, the communications technology satellite, was launched on a two-year mission to explore not only the technical aspects, but also the social implications of satellite communications. [37] After its launching, the satellite was used on an every-other-day time-sharing basis with the US throughout its designed life span of two years, and during a third year of extended lifetime.

The Hermes Satellite

Under a joint agreement signed between the Canadian Department of Communications (DOC) and the US National Aeronautics and Space Administration (NASA), the Hermes-CTS satellite was used for experiments by both countries. [38] It was the first communications satellite to provide communications services in the 14/12 Ghz frequency bands. Its high power (200 watts) meant smaller and less expensive ground terminals could be used. One of the goals of the Hermes program was to conduct

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[37] Irvine Paghis, ed. Hermes, The Communications Technology Satellite, Its Performance and Applications, Proceedings of the Royal Society of Canada, 20th Symposium, Vol. 1, 1977.

[38] The agreement was signed in April 1971. For more infomation, read Paghis, Hermes, pp. 11-42, 43-64.

experiments using the low-cost ground terminals and "to evaluate the economic social and political impact of the future introduction of new services such as two-way tele-education and telemedicine...." [39]

Evaluation was an early focus of these experiments, with an emphasis on the experimental and demonstration nature of the projects. For the Hermes-CTS experiments, the production of an overall evaluation report, at least for the educational experiments, gave the collected experiments a program connotation. [40]

Organized, centralized efforts for evaluation of the experiments did not take place initially. In fact, the evaluation problem, for telemedicine experimenters especially, prompted a great deal of formal and informal comment during debriefing sessions, and in published and unpublished materials following the termination of experiments as well as during the height of the activity. The evaluation requirement took up much of the discussion time at both planning and reporting sessions. Some of these evaluation issues will be brought out through the elaboration of the review study which follows.

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[39] T.R.Hartz and I. Paghis, Spacebound Ottawa: Department of Supply and Services, 1982. p. 110.

[40] A program is an ensemble of activities or projects tending towards some goal or set of goals. Government programs were defined as such in Chapter Two of this work.

The Anik-B Satellite

The Anik-B satellite was launched in December 1978. While the Hermes nontechnical projects were labelled experiments, the subsequent Anik-B projects were to be called pilot projects, meant to be preparatory to future operational systems utilizing satellites in the public services. The anticipated role was made quite clear by Chapman, speaking as assistant deputy minister space programs, in his remarks at an early Anik-B information exchange meeting held in Ottawa in October 1977. "Hermes - type applications need to be further tested and developed," he said, so the goals of the Anik-B program were outlined:

> " 1. To determine the viability, on a pre-operational but continuing basis, of telecommunications services designed to meet identified requirements;
> 2. To develop the knowledge and expertise to better utilize 12/14 GHz satellite communications technology; and
> 3. To develop and create awareness in user institutions of the potential of telecommunications to deliver new services." [41]

A satellite channel was leased by the DOC from Telesat Canada for a period of two years. Thus a free channel, along with earth terminals, maintenance and consultation were offered by the DOC. Users were to provide interface equipment, personnel and evaluation costs.

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[41] Government of Canada, DOC, Anik-B Information Exchange Meeting Proceedings. (Ottawa: Department of Communications, October 25-26, 1977).

Satellite Telemedicine in Canada: A Reevaluation

This study consists of those satellite experiments (on Hermes) or pilot projects (on Anik-B) which had as one of their major objectives, the delivery of health and medical care and information in the context of the Canadian health care system, and which were subsequently evaluated. Three such projects qualify under this description. The first two used the Hermes satellite.

1. The Memorial University telemedicine project.
2. The University of Western Ontario - Moose Factory experiment.
3. The Montreal-James Bay project.

In addition, Memorial University conducted an Anik-B project to test transmission to voice-grade signals in audio-conferencing and fixed image or slow scan transmission of medical information. This pilot project was not evaluated and has therefore not been included in this review, which is based on evaluations of pilots and experiments.

III. The Hermes Experiments

Planning

At the first Canadian Telemedicine Symposium held in October 1975, Chapman described how experiment proposals were received:

> ". . .in 1972, a process of sollicitation was initiated in which the CTS technology and its applications were explained to potential users across the country who were then invited to make proposals for experimentation" [42]

According to N.G. Davies, forty-nine proposals were received by the experimental evaluation committee, thirty-three were recommended for approval by the DOC. Nine were subsequently withdrawn, sixteen of these were accepted as social experiments, including three which were related to health care delivery. [43]

Other than this process of experiment solicitation and selection, little by way of actual preparation and planning took place for the social experiments which were carried out on Hermes. The literature reviewed indicates a stronger emphasis on the technical experiments. This technological thrust is reflected in these Hermes objectives:

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[42] John H. Chapman, "Satellite Technology in Canada," in First Canadian Telemedicine Symposium University of Western Ontario, London, Ont., 1975.

[43] Paghis, Hermes, p. N-41.

" The main objectives of DOC in the CTS project are three-fold:
-to establish in Canada a capability in the design and manufacture of spacecraft systems for domestic use and for export;
-to maintain a Canadian capability to specify, assess and construct space application systems for domestic use;
-to conduct communications experiments to explore the use of future high-power communications satellites in Canada." [44]

The specific technological objectives were given as:

". . . to develop and flight test:
- a high-efficiency two hundred watt travelling wave tube which, together with the high-gain spacecraft antennas, will give a radiated power from the satellite about four hundred times greater than that of existing operational systems;
- a lightweight extendible array of solar cells which will provide after launch approximately twelve hundred watts of primary power for operation of satellite systems;
- a three-axis stabilization system which will permit accurate pointing of the highly-directive spacecraft antennas." [45]

The social experiments seem to have occurred as an afterthought: "Once the program was established," stated Chapman, "the DOC realized the desirability of expanding the scope of the project to provide an opportunity to potential user groups to test the utility and effectiveness of the CTS technology for their specific needs." [46] He listed some social policy objectives which, he said, "had been developed through the solicitation process." [47] These objectives were:

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[44] Chapman, "Satellite Technology," pp. 13-14.

[45] Ibid.

[46] Ibid.

[47] Ibid.

"- to evaluate the applications of CTS technology in a variety of applications and user environments;
- to develop strategies for the planning of operational communications systems for applications in the areas of health, education, community development, and administration;
-to analyze and develop policies which will facilitate the operational applications of telecommunications in innovative services;
-to create awareness of the potential utility of telecommunications, its problems and advantages among service agencies and institutions which will be users of the technology." [48]

The lack of planning contributed to a number of practical problems and dilemnas, mostly related to funding, or the lack thereof, and the responsibilities and roles of the various agencies with reference to evaluation of the experiments. The low level of attention given to the social experiments led to the absence of an overall plan for the telemedicine experiments. This in turn, suggests that the satellite was the driving force for experimentation rather than the user or sector needs being the driving force. The technology push aspect has led evaluators to comment about the dilemna posed by projects which take place in the absence of need. For example, Richmond has described this dilemna in no uncertain terms. [49]

Needs determinations were not conducted by the DOC, other than the 1967 survey reported by Chapman and mentioned above. The only context-specific needs analyses conducted were those done by individual experimenters. Memorial University of

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[48] Ibid.

[49] Irvine Paghis, ed. Hermes(the Communications Technology Satellite): Its Performance and Applications Proceedings of the Royal Society of Canada 20th Symposium, Vol. 3, Ottawa, 1977.

Newfoundland's telemedicine project was exceptional in this regard. Some years later, the DOC attempted to remedy this situation by commissioning a nation-wide survey of health care user needs for telecommunications. This survey is reviewed in chapter four. [50]

One of the conclusions drawn from deliberations at a Hermes debriefing session was precisely that:

> "In future projects it will be important to establish from the outset and communicate widely a consensus in the overall experimental objectives and the key questions to which evaluators should address themselves." [51]

Without planning, and without specifically defined "needs" meant that individual experimenters were free to choose which objectives to pursue, or to decide which 'needs' might be addressed using the satellite Hermes. For some , the lack of attention to the social needs simply reflects a dominant hardware orientation in the development of the communications experiments. Still, although these communications experiments were far less important than other aspects of the space program public attention was focussed on the communications aspects. [52]

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[50] Woods Gordon, Uses of Telecommunications within the Health Care System, Report to the Department of Communications (Toronto: Woods Gordon, For the DOC, 1983).

[51] D.H. Jelly, ed. "A Report on the Process of Implementation of Hermes Experiments," CRC Technical Note 694-E, Department of Communications, Ottawa, July 1978, p. 9.

[52] Jean McNulty, "Canadian Government Policy Regarding A Domestic Satellite Communications System," July 1981, Unpublished.

More attention was focussed by the DOC on the evaluations of these projects than on their planning. This may have been due to the fact that the legitimization of program evaluation in Canada was gaining momentum at the time of the Hermes experiments, and came to full bloom about the time the experiments were to begin.

Following the Hermes experiments, those communications projects destined for the Anik-B satellite were prefaced by a two-stage needs survey which was conducted to consider educational needs for satellite applicatons. [53] No comparable survey of health needs has was done in Canada. [54]

There were two major Canadian telemedicine projects using the satellite Hermes. The first to be considered is that mounted by Memorial University of Newfoundland (MUN). [55] The second experiment to be reviewed is the telemedicine experiment which took place at the University of Western Ontario (UWO) linking two remote sites in Northern Ontario to University Hospital in

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[53] Michel Robin and John S. Daniel, "The Use of Satellite Systems in Canadian Education, Needs Survey: Second Round," Department of Communications, Ottawa, 1977; and John S. Daniel, "The Use of Satellite Delivery Systems in Education in Canada: the Costing of two Networks and a Preliminary Needs Survey," Vol. 2, OSU 76-00136, Department of Communications, Ottawa, April 1977.

[54] Some years later the form of Woods Gordon was commissioned to conduct a needs survey for the health sector. This survey is reviewed in Chapter Four.

[55] Memorial University continues to operate a fluorishing distance education project for health and medical people in remote areas, using teleconference equipment based in the faculty of medicine at the hospital.

London.

MUN Telemedicine Project Using Hermes

This part of the study was written using information gathered from a variety of published and unpublished sources. [56]

History

MUN developed the idea for its Hermes telemedicine project based on a long history of commitment to providing distance education to learners in widely dispersed communities all over Newfoundland and Labrador. The geography, climate, and

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[56] A.M. House, "Telemedicine in Canada," Journal of the Camadian Medical Association 117(August 1977):386-388; Telehealth '79:Exploring the Future of Telecommunications in the Field of Health Care: Proceedings, Winnipeg, Man.. n.p., October 1979:193-205; Irvine Paghis, Hermes Vol. 1, pp. 221-238; A.M. House and W.C. McNamara, Report on Memorial University of Newfoundland's Experimental Use of Communications Technology Satellite Hermes in Telemedicine. Funded by the Department of Communications (DOC), Ottawa, n.d.; A.M. House, M.D. Robbins and J. Roberts, "Trial Use of Slow-Scan Equipment to Transmit X-Rays via the Satellite Hermes," Funded by the DOC, Ottawa, n.d.; Craig McNamara, "Adapting Communication Technology to the Rural Society," Interactive Telecommunications Systems in Social Uses, Electro Professional Program New York, 24-29 April 1979; Paghis, Hermes Vol. 1, pp. 231-244;and Alan Pomfret, Final Evaluation Report on Memorial University of Newfoundland Telemedicine Project: Focus on Implementation and the User, Contract No. OSU 76-00194 and OSU 77-00065, (St. John's: Memorial University of Newfoundland, March 1978).

Additional information was also provided in Richmond and Daniel's overall evaluation of the Hermes experiments in proceedings of the Hermes debriefing session, and through interviews conducted with the project director and participants during a site visit in 1980.

transportation facilities of Newfoundland and Labrador were the primary forces motivating the University to seek innovative ways to provide education to professionals who could not travel to urban areas for courses. Pomfret explains the geography:

> "The province of Newfoundland and Labrador has a total area of approximately 143,000 square miles and a population of 522,100 (1971 census); the Labrador portion has 50,000 people scattered over 103,000 square miles. "
> As the province's only university, Memorial University has always had a commitment to making its resources available to the whole province." [57]

The teacher-upgrading program was made possible by sending video tapes to thirty communities, where small VTRs were installed in learning centres. Despite problems in administration, equipment choice, purchase and maintenance, the program grew substantially A drawback, however, was the passive nature of the course delivery, with no opportunity for student feedback. McNamara reports experimenting with conference calls, audiotapes, and finally, tutors. The tutors were local residents who had completed a degree program and who could provide assistance to local students by answering questions following viewing of videotapes, and act as a link to MUN.

However, the tutorship system was abandoned when it became expensive and difficult to obtain tutors. The concern for feedback remained, and MUN continued to explore other methods to assure some form of two-way contact with students enrolled in

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[57] Alan Pomfret, Final Evaluation Report on the Memorial University of Newfoundland Telemedicine Project: Focus on Inplementation and the User. (Ottawa: Department of Communications, 1978), p. 2.

their distance education programs. Thus Hermes was seen as offering a solution to the lack of interactivity which previous distance education efforts were unable to provide.

Planning

In June 1972, DOC officials visited Newfoundland and outlined the CTS Hermes plan. A fifteen-member Newfoundland Communications Technology Committee (NCTC) was formed. In October 1972, a proposal was presented on behalf of 13 user agencies. MUN's ETV department committed itself to allocating 50% of its resources to planning and production of programmes. Out of this initiative came the proposal for Newfoundland Experiments with the Technology Satellite (NETS) which was submitted to the Hermes experiment evaluation committee.

From its inception, the project was plagued by funding uncertainties "almost causing the termination of the project on several occasions." [58] As a result, the University's extension service decided to withdraw from the project, and so, the educational television department and the faculty of Medicine co-sponsored the telemedicine component of the project.

The burden of the project was now placed on the co-investigators who turned it into what they called a

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[58] S. Craig McNamara, "Adapting Cimmunications Technology to the Rural Society,"Interactive Telecommunications Systems in Social Uses. Proceedings, Electro Professional Program, (New York, NY: April 1979), p. 29/5.

telemedicine project.

The Experiment

The project had three components:

(1) continuing education for health care professionals;

(2) consulting services and the transmission of medical data;

(3) community health education.

The project's main focus was continuing education. Between March 14th and June 18th 1977, one hundred and forty hours of satellite time were made available. As a result of the withdrawal of the extension division from the project, one hundred and forty hours had to be filled by telemedicine content, only forty of which had been planned. Approximately 20% of the hours were left unscheduled.

Programs originated from St John's which was equipped to send audio and video signals from three locations. Programs were received at four sites, each was equipped with two-metre terminals to receive video and audio from St. John's, and transmit audio only. The sites and their hospitals were Sir Thomas Roddick Hospital, Stephenville, Curtis Memorial Hospital, St. Anthony, Melville Hospital. Goose Bay and Captain William Jackman Hospital, Labrador City.

Altogether one hundred and thirty-four hours of programming were broadcast. Most of the content was devoted to:

PROGRAM CONTENT AND NO. OF HOURS	
Continuing Medical Education	57.5 hours
Continuing Nursing Education	13.5 "
Standards in Health Care	12.5 "
Community Health Care	22 "
Consultations	4.5 "
Special Programmes, including	
Opening and Closing ceremonies	26

Source: House and McNamara [59]

The Slow Scan Experiment

Time was made available during MUN's telemedicine project for transmission of x-rays using slow scan equiopment. At the time of the Hermes project, seventeen of Newfoundland's twenty-four radiologists were concentrated in four St John's hospitals. Many hospitals had x-ray equipment, but no radiologists. For example, were resident in Labrador City, where a sixty-five bed hospital served sixty-four thousand people. X-ray films were usually sent by mail for interpretation in St John's.

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[59] A.M. House and W.C. McNamara, Report on Memorial University of Newfoundland's Experimetal Use of Communications Technology Satellite Hermes in Telemedicine (Department of Communications, Ottawa, n.d.), p. 35.

In several other telemedicine projects in the US and Canada, slow scan equipment had been used for the transmission of x-rays. [60] Prior to the Hermes experiment, manufacturers had developed prototype equipment, and one of them, Colorado Video, made their equipment available to MUN on a free trial basis of one month (in November 1975).

Slow scan equipment permits the transfer of images using ordinary narrowband telephone lines, as opposed to the broadband transmission link needed to transfer live video images. As the term suggests, the image is scanned, line by line, until the whole picture is reconstructed at the distant site. Original slow scan equipment could take up to seventy seconds to build an image of sufficient detail for adequate interpretation.

As part of the MUN Hermes telemedicine experiment, the slow scan transmission of x-rays was undertaken from Labrador city to St John's for a three month period. An extra audio channel was made available on the satellite for this transmission. Between May 31, and June 18, 1977, thirty-three hours were used to transmit x-rays and ECGs. During the satellite trial time , several drawbacks were encountered. The lack of an extra audio line made impossible any verbal dialogue simultaneously with the transmission of the images. A persistent artifact could not be

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[60] For example, the University of Toronto telemedicine project which has been reported by Dunn et al describes the comparison of this system to three others. This project is an ongoing telemedicine project linking two University of Toronto Hospitals and remote areas in Northern Ontario. See E.V. Dunn et al. "An Evaluation of four Telemedicine Systems for Primary Care," Health Services Research 12(Spring 1977):19-29.

completely removed, making image reception and interpretation difficult.

An overall negative reaction to this method of transmitting images was reported by participating radiologists, with substantial disagreement on radiologic interpretation and primary diagnoses done when direct viewing of films was compared to slow scan viewing. The report writers urged that results should be viewed with scepticism for a number of reasons, mostly based on reporting and viewing arrangements.

The overall flavor of this part of the project was highly technical and equipment-conscious, [61] and the human factors seem to take second place to hardware problems. As well the experiment is not re-evaluated in the overall MUN project, nor is it considered in the overall evaluation sponsored by DOC, which suggests that little attention was focussed on this part of the experiment.

While no evaluation protocol was described for the slow scan part of MUN's telemedicine project, a considerable effort went into the evaluation of the educational aspect of the project.

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[61] See A.M. House et al. Trial Use of Slow Scan Equipment to Transmit x-rays via the satellite Hermes. Final Report. (Ottawa, Department of Communications, 1977).

Evaluation

House (1977) described how confusion existed from the beginning about responsibility for project evaluation. A

> "...complexity of interests was reflected in the development of the project's evaluation plan. The initial NETS proposal indicated that evaluation activities would be carried out by the project's principal investigators. Later, the DOC decided that the Hermes experiments should be evaluated in part by an external team of researchers who would be on contract to DOC with a mandate to evaluate various projects, including the Memorial one. Finally it was agreed that the primary evaluation of the Memorial project would be carried out by a researcher based at Memorial who had not had any involvement in the project formulation." [62]

In their report to the DOC, the co-investigators described the evaluation plan as focussing on two issues. One was termed educational efficacy and the other was "the examination of the factors associated with the implementation of the project." The evaluation is "oriented towards the educational aspect of the project, in consideration of the fact that this project is overwhelmingly educational in content." Of one hundred and thirty-four hours of programming, four and a half were consultations, and twenty-one were special programs to include, for example, project management meetings, demonstrations of slow scan activities, a program about other telemedicine systems, some family/patient tele-visits, and two major conferences. "Consultation activities in the project were limited to four and a half hours as the terminal configuration did not lend itself

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[62] Paghis, Hermes, Vol. 1, p. 224.

well to this application. The following information is drawn largely from Pomfret's two hundred and sixty-five page final evaluation report submitted to the DOC in March 1978. [63]

Pomfret began his report by making reference to the disparities in the provision of health care services to persons in remote areas of Newfoundland by comparison to those in urban areas. He compared Newfoundland to the rest of Canada along six health care measures and concluded:

> " The figures provide some indication of the pressure placed upon the province's existing human and material medical resources in comparison to Canada as a whole. In terms of hospital services alone, Newfoundland and Labrador has relatively fewer doctors and beds and relatively greater admissions and annual admissions per bed." [64]

As a departure point, the telemedicine project did "not purport to address directly the problems associated with the provision of various health care services" but instead aimed to "generally improve the capabilities of the existing health care system by linking the Faculty of Medicine at Memorial via Hermes to hospitals in Goose Bay/Happy Valley, Labrador City, St Anthony, and Stephenville." [65] The co-principal investigators list as the primary objective, the exploration of the

> ". . . feasibility of delivering continuing education programmes for a variety of health are professionals utilizing one-way video and two-way audio and thus permitting recipients to stay in their place of work

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[63] Alan Pomfret, Final Evaluation Report, 1978.

[64] Ibid, p. 4.

[65] Ibid, p. 7.

while tutors remained in the University setting." [66]

In what he termed was an understatement, Pomfret stated that the proposal changed drastically over the years:

> "...change was substantial in terms of the content and structure of course offerings. . ." [67]

He then goes on to list the important ways the evaluation scheme had to be altered to account for the different focus of program content.

> "From the perspective of the evaluation, the key changes were in the project's course structure ... The CME [continuing medical education] component shrank from the projected eighty per cent to an actual forty-two per cent of actual broadcast time. Instead of four courses directed to an estimated sisty doctors, numerous mini-courses of one to two hours duration each became the norm." [68]

Again, according to Pomfret, the number of potential participants expanded to include one hundred and eighty-five nurses, one hundred and forty-seven nursing assistants, and seventy-eight hospital administrators, and about forty-four instructors.

Theoretical Perspective

The evaluation was originally meant to focus on learning outcomes but these had to be de-emphasized because of the impossibility of reasonably accurate measurement. As an example

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[66] Ibid, p. 10.

[67] Ibid, p. 19.

[68] Ibid, p. 22.

of the flexibility required to adapt to the changes in the project, the evaluator increased the project implementation focus of his evaluation scheme and omitted cost-benefit analyses because data was unavailable. He concentrated on two aspects: (1) attendance (how often people attended the broadcast sessions); and (2) project support. Participants in four hospitals were the principal respondents to questionnaires and structured interviews.

One focus did remain constant in the plan, and that was the emphasis on the innovative aspect of the project: "what is being evaluated is the implementation of a social innovation." [69] He classified the telemedicine project as a 'social innovation' because the "project's objectives included changes in the behaviour and perspectives of users." [70]

Pomfret makes explicit the following theoretical perspective for his evaluation. He claims as insufficient the previous emphasis (in the literature) on user resistance to change, in the process of implementing innovations, going on to show that there are other barriers to successful implementation. "Barriers such as lack of time, information, materials, training, and ongoing planning," lead users to simply "give up out of frustration, exhaustion, fear of failure, and so on." Moreover, he claims support for change is not a fixed entity: . . .participants may alter their perspectives concerning the

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[69] Ibid, p. 24.

[70] Ibid, p. 28.

value of the change." [71] Because of these factors, Pomfret emphasizes the importance of the user, but this is in aid of creating a

> ". .set of conditions that would enable and encourage users to participate in and to come to perceive specific project activities as worthwhile. The other [concern] was to present the project in such a way that users could assess the potential value of the approach represented." [72]

Pomfret lists factors that can discourage project acceptance. He goes on to concentrate the evaluation of the implementation of the project along the two lines mentioned above: session attendance and user receptivity.

Evaluation Methodology

Pomfret conducted interviews of a minimum of three people at each site over three time periods (before, during and after broadcasts). Those who attended the sessions were asked 'how they felt' about (1) broadcast quality, (2) the quality of instruction, and (3) the degree and quality of interaction, using questionnaires which probed user reactions along a four-point scale, resulting in what one experimenter later called "happinesss indices." [73] The ratings were reported in tables reflecting mean scores, and 'direction of rating'

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[71] Ibid, pp. 28.

[72] Ibid, p. 28-30.

[73] Interview with project principal in August 1981.

expressed as percentages. [74]

The following remarks are drawn from Pomfret's summary sections following presentation of data:

Re: Broadcast quality:

> "For most people, the equipment functioned consistently in a highly satisfactory manner .....
> "For others, equipment functioning improved. And for others still, equipment functioning deteriorated." [75]

Re: Instructional quality:

> "Judging from these four indicators, the instructional components of the project appear to have gone rather well" [76]

Re: Interactivity:

There are many definitions of interactivity within the Hermes experiments. Casey-Stahmer lists the following concepts which can inform a definition: participation, humanizing, communications, feedback, physical facilities, hierarchy, accessibility, transparency, symmetry. Pomfret used three questionnaire items which focussed on practical evidence of interactivity such as use of microphones, inter-site contact, participation during broadcasts, and continuity. Using these parameters he found: "... all respondents valued the system's interactive capacity" and "conditions were moderately

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[74] Gamma and Kendall's tau statistical tests were used to estimate consistency of responses and Yates corrected Chi-square was used as test of significance for all 2 x 2 tables with more than twenty-one cases.

[75] Pomfret, Final Evaluation Report, p. 49.

[76] Ibid, p. 55.

facilitative of interaction..." [77]

The co-principal investigators appeared to differ. They reported in 1977 that

> "The interactive capacity of the satellite had been a primary reason for our participation in the programme. Our experience. . . showed that interaction did not just happen, but had to be encouraged. . tutors had to be reminded that they. . . were to use seminar format with audience involvement...." [78]

Simulations were found to be useful in preparing tutors for interaction and the presence of a moderator also helped, according to House and McNamara. [79]

Re: Comparisons with Classroom teaching:

Users were highly supportive, according to Pomfret, but

> ". . . the satellite classes compared rather favourably with conventional classes," and
> "close to seventy per cent of all respondents either preferred satellite to conventional classes or expressed no preference." [80]

Overall, Pomfret cautioned "The evaluation of the Telemedicine project was confronted with both the lack of control group and lack of treatment specification problems." [81]

Pomfret attempted to establish the level of user receptivity along three measures: (1) support (defined as the general level of enthusiasm); and (2) preferred use (whether satellite system is preferred to face-to-face); and (3) future

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[77] Ibid, p. 69.

[78] Paghis, Hermes, Vol 1.p. 255.

[79] House and McNamara, Report on Memorial University, n.d.

[80] Pomfret, Final Evaluation Report, p. 79.

[81] Ibid, p. 74.

use (if participants "would like to use the satellite system" in the future). He explained that user receptivity, however, was not a fixed entity.

> "The main conclusion was that while in an absolute sense most users remained in favour of the project, some increased their support while even more became less receptive." [82]

Pomfret did not evaluate the teleconsultations except for a rating on user satisfaction. He concluded that users generally valued the consults, but physicians were the least receptive.

Instructor perceptions were gauged by interview shortly after the last broadcast. They "reacted quite favourably to the project and their role in it" but "the system's interactive capacity received the most criticism. Instructors wished the system allowed for greater interaction." [83]

Recommendations

Pomfret listed thirteen recommendations at the end of his report. He recommended that

- target audiences for such programs should consist of more health personnel since there are too few physicians to make the effort cost-effective;
- potential audiences should be involved in planning;
- sessions should be shorter;

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[82] Ibid, p. 122.

[83] Ibid, p. 189.

- broadcast times should be compatible with working schedules:
- satellite systems should have two-way audio;
- research is needed to assess the relationship of various project components to learning outcomes.

In striking contrast to the inward orientation of these recommendations by the 'outside' evaluator, the principal investigators of the experiment stressed these conclusions, which are more oriented to an outsider's view of their project:

- We carried out our activities via satellite because the system was offered at no cost. Had similar facilities been freely available on terrestrial communications systems, we could have conducted exactly the same project.
- Funding policies should be developed by various agencies as experimenters need programmes to which they can apply for funds to support further work.
- The interests of experimenters, funding agencies, systems developers, etc. may not be identical, even though all are focussed on the same technology. It seems important to identify and define these interests at the outset of a project.
- Future telemedicine projects should devote more attention to the personal implications of utilizing telecommunications
- Projects adopting a comparative research design seem necessary to clarify the relative merits of the different technologies.
- Further research in telemedicine should involve health care

professionals and should relate telemedicine to current research in health care delivery.

One of the reasons for the difference in orientation of these conclusions may lie in the different labels of the telemedicine project. The evaluator called the project a 'social innovation'. The investigators themselves described it as a feasibility study. The DOC referred to the projects as experiments. The experiments have also been called demonstrations.

Re-Evaluation

The Hermes experiments were re-evaluated by a separate evaluation team. An overall evaluation of the educational experiments was put into action. Included was a re-examination of MUN's telemedicine experiment, particularly its significant educational component. The overall evaluation effort was conducted by two evaluators (Richmond and Daniel, 1979). [84]

The overall evaluation was developed using a framework and a model based on Stufflebeam's "context-input-process-product" (CIPP) scheme. Stufflebeam offers this definition of evaluation:

> "Evaluation is the process of delineating, obtaining, and providing useful information for judging decision

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[84] A. Murray Richmond and John S. Daniel, "Evaluation of the Educational Experiments on the Hermes Satellite," Final Report, DOC Contract No. OSU 77-00202, February 1979.

alternatives." [85]

Stufflebeam lists three classes of decision settings, drawing on the work of Braybrooke and Lindblom. [86] An incremental policy model informs what Stufflebeam differentiates as three orders of change, from the small, restorative (not likely to affect change), to the larger neomobilistic (oriented to decision making), which innovations might bring. Metamorphic decision making is dismissed as utopian, for complete radical changes are unlikely in the educational system. Incremental decision making is very prevalent, on the other hand, and "many so-called educational innovations are of the incremental type." [87]

Context evaluation, one of four types of evaluation described by Stufflebeam, is the most basic kind. Its purpose is to provide a rationale for the determination of objectives. It limits the evaluation activity.

Richmond and Daniel applied the Stufflebeam framework for the overall evaluation of the Hermes educational experiments. They thought the CIPP model sufficiently flexible to suit a variety of projects and a range of evaluation budgets. The results of the overall evaluation study has brought to light a

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[85] Blaine R. Worthern and James R. Sanders, eds. Educational Evaluation: Theory and Practice (Worthington, OH: Charles A. Jones Publishing Co., 1973), p. 129.

[86] David Braybrooke and Charles E. Lindblom, A Strategy of Decision (New York: Free Press, 1963), as cited by Worthern and Sanders, Educational Evaluation, pp. 128-142.

[87] Worthern and Saunders, p. 132.

number of issues which apply to the Hermes social experiment venture, particularly the tele-education experiments.

In their review of MUN's telemedicine project, Richmond and Daniel placed some importance on how the Hermes experiment was seen to fit within the overall objectives of MUN, of its medical school in particular, and on the importance MUN attached to continuing medical education.

Reviewing the project's funding problems, Richmond and Daniel report that the telemedicine project was funded by an amount which exceeded two hundred and seventy thousand dollars by the DOC over the period 1973-77. Other than this, their re-evaluation does not add new information to the facts already brought out by Pomfret, House and McNamara in their reports and in the material reviewed for this study. However, they take the concept of 'implementation of a social innovation' one step further by testing some hypotheses or statements by Hooper (1975) about factors which "facilitate the assimilation of new technology in educational institutions." MUN scored highest, for instance, in that "the technology [answered] real needs linked to the primary objectives of the institution." [88]

One of the conclusions that Richmond and Daniel draw is that Hermes had had a "significant impact" and that this is obvious "in the number of proposals which have been received for

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[88] Richmond and Daniel, Evaluation of Educational Ecperiments, 1979, p. 108.

pilot projects on Anik-B." [89]

It is important to note that Richmond and Daniel's inclusion of the MUN experiment in the overall evaluation of the educational experiments on Hermes meant that they treated MUN's experience as more educational than medical. The University of Western Ontario's experiment (a description of which follows) was not included in this overall evaluation.

Telemedicine Experiment Spin-Offs

There were two developments at the MUN school of medicine which resulted from the Hermes experiment. One was the development and installation of a four-wire terrestrial audio teleconference system through dedicated duplex lines, with a teleconferencing bridge located at MUN. This system, as of August 1984, was reaching over ninety sites in Newfoundland and Labrador and was being used for continuing education and administrative purposes such as meetings.

A second result was the involvement of MUN in an Anik-B pilot project. This project was to test the efficiency of satellite communications to extend the teleconference system, to further test slow scan television transmission, and if possible, to establish a satellite communication link to an offshore petroleum installation to provide general communications

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[89] Ibid, p. 113.

services, health care, and education. [90]

This telemedicine project is not included in the present study because published and unpublished information available at the time of writing does not include an evaluation report. Otherwise it is not substantially different in content to other material reviewed in the three projects contained in the case study under discussion. [91]

The Moose Factory Experiment

This part of the study has been reconstructed using a variety of published and unpublished sources of information. [92]

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[90] Judy Roberts, "H-1 Telemedicine Project," in Summary Record of the Anik-B Users Meeting, Ottawa, 5 June 1980.

[91] For more information see: A.M. House, Memorial University of Newfoundland Anik-B Pilot Project: Final Report. (St. John's: Memorial University, Faculty of Medicine, 1981).

[92] Lewis S. Carey and Earl S. Russel,"A Telemedicine Experiment in Canada Using Satellite Hermes: A Telecommunications Experiment between a Remote Nursing Station (Kashechewan), a Base Hospital (Moose Factory General Hospital) and a Health Science Centre (University of Western Ontario, London, Ont.)," Prepared for Health and Welfare Canada, January 1978; Lewis S. Carey et al. "Radiologic Consultation to a Remote Canadian Hospital Using Hermes Spacecraft," Journal of the Canadian Association of Radiologists 30(March 1979):12-20; Paghis, Hermes, Vol. 1, pp. 187-204; Borys Koba, "Hermes U-6: Telemedicine Experiment from Kashechewan and Moose Factory to London Ontario," System Analysis Control and Design Activity, Report No. SACDA-77-9, April 1977; Paghis, Hermes, Vol. 3, pp. 211-230; Robin S. Roberts et al. "The Moose Factory Telemedicine Project," Department of Clinical Epidemiology and Biostatics, Faculty of Health Sciences, McMaster University, Hamilton, Ont., March 1978; D.A. Phillips and W.C. Trueniet, "Man-Machine Interaction in the Hermes Experiments," 3 vols., CRC Report No. 1320-1E, 2E and 3E, Department of Communications, Ottawa, 1978; Martin C. Elton, William A. Lucas and David W. Conrath, eds. Evaluating New Telecommunications Services (New York: Plenum

Background

The literature about the Moose Factory telemedicine experiment brings out the controversies created by this project. Not only is there disagreement about the project's usefulness, there is controversy about the evaluation procedures and their results, which eventually led to changes in evaluation procedures, the resignation of one of the coordinators and to an interruption of data collection procedures during the project. These conflicts are made explicit in the documents examined for case study. They will emerge as the study unfolds in the sections which follow.

The Moose Factory medical service program was initiated in 1965 to provide medical assistance to a Northern Ontario zone which extends from Moose Factory "at the southern tip of James Bay northeast some eight hundred miles to Povungnituk and Sugluk and northwest some three hundred and fifty miles to Winisk and

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[92](cont'd) Press, 1978), pp. 107-124; Alex Sophianopoulos and Mark Mills, "Medicine in the North: A Unique Experiment," Telesis 5(1976):259-262; Irvine Paghis, "Long Distance Diagnosis," Insearch 4(Spring 1977):2-9; Robin S. Roberts, Sally Skene and Gloria Lyons, The Moose Factory Telemedicine Project: Final Report. (Hamilton, Ont., McMaster University, March 1978); Lewis S. Carey, "A Telemedicine Experiment in Canada Using Hermes," Telehealth '79, Proceedings, Winnipeg, Man., 23-24 October 1979, pp. 19-26; Earl S. Russell, "A Telemedicine Experiment in Canada using Hermes," Telehealth '79, Proceedings, Winnipeg, Man., 23-24 October 1979, pp. 27-36.

Dr. Carey was also interviewed during a site visit in August 1981.

Fort Severn - all lying along the shore of Hudson Bay. Seven of the villages served are in Ontario and ten others are in Quebec." [93] At the time of the project, the population was about ten thousand, predominantly Cree Indians and Inuit.

The one hundred and thirty bed hospital is located at Moose Factory and had three staff physicians, one of whom was a surgeon. Consultants from the various medical specialties at the Health Science Centres made periodic visits to the hospital and villages.

Carey and Russell begin their 1978 report by stressing the disparities in health care provision between North and South Canada.

> "The backbone of the medical service.. . . is the northern nurse. Thirty-six nursing stations serve the area; the average distance to the nearest hospital is around three hundred and eighty miles, with actual distances ranging from thirty-five to nine hundred and ninety-five miles. The turnover rate of nurses is high and during a recent two year period was in excess of sixty-five per cent for the one hundred and sixty-eight nurse positions in the territory." [94]

The specific transportation and communications difficulties are also described:

> "Transportantion and radio-telephone communication between the nursing stations and Moose Factory Hospital is often impossible because of unfavourable ionospheric conditions existing in northern latitudes. . . radio telephone contact may not be possible, Transportation throughout the zone is primarily by aircraft." [95]

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[93] Most of the information is taken from the Carey-Russell report dated January 1978.

[94] Carey and Russell, "A Telemedicine Experiment," p. 4.

[95] Ibid.

In the Carey-Russell report, these facts are used to set the stage for exploring

> "alternative ways of improving the access to medical services and at the same time utilize more efficiently the total range of services available at the Health Science Centre." [96]

The Project

In July 1973, UWO submitted a proposal to the Hermes experiment evaluation committee and received approval for a telemedicine experiment. The objectives were:

1. to test alternatives and additions to the existing system of providing medical specialist support to remote base hospitals,
2. to assess if the scope of support to a base hospital can be increased without major strain on the resources of the university hospital,
3. to identify the uses of the telemedicine system which are of benefit to the base hospital,
4. to describe the use and effects of the communications technology employed in support of medical specialist consultation,
5. to assess the acceptance of the system by the care providers and allied health personnel,
6. to analyse the effect of reliable communications links between the nursing station and the base hospital upon patient management and professional satisfaction of the nurse providers,
7. to describe the acceptance of the telemedicine system by the communities at large, i.e., patients, relatives, village leaders. [97]

As with MUN, funding uncertainties "necessitated postponement of the starting date" and "the scope of the program

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[96] Ibid.

[97] Elton, Lucas, and Conrath, New Services, pp. 107-124.

was reduced." [98]

The Kashechewan (Kash) connection consisted of a link to Moose Factory General Hospital (MFGH) and the University Hospital (UH) with communications facilities permitting voice communications, ECG transmission and telecopier transmission between all stations. The experiment used three satellite terminals, to provide two-way voice communications between all three sites, and one-way video transmission (black and white) from MFGH to UH in London, Ontario.

From October 28, 1976, to February 25, 1977, the broadband channel on Hermes was available for four hours on alternate days for video transmission. Project directors Carey and Russell's report describing the experiment's activities concentrates on hardware description more than other project literature. The title "Telemedicine Project U-6" for instance, has a hardware connotation, although 'U-6' is never described. Considerable space is devoted to a description of the satellite and auxillary apparatus.

Program Content

Carey and Russell list six types of medical images which were transmitted, the majority being x-rays. A wide variety of specialist consultations including psychiatry, paediatrics,

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[98] Carey and Russell, "A Telemedicine Experiment," p. 8.

pathology, obstetrics, and cardiology took place, and a significant portion of the Carey-Russell report is devoted to eight "illustrative case histories" to demonstrate "the value of modern reliable audio-visual telecommunication," but the reader is not told what is the total population of cases from which these are selected. The system is described as being very useful for each one of the case histories, in helping the nurse plan the treatment of a child (case number one), in providing accurate diagnoses of x-ray films (cases two and four), in preventing the evacuation of a pregnant patient through ultrasound diagnoses (case number three), how the system was used to repair equipment at MFGH with guidance from an expert in London (case number five), and an account of three fluoroscopic examinations done with remote supervision from the radiologist in London.

Project Controversy, Crisis and Conflict

As part of their report Carey and Russell (1978) included a significant section devoted to evaluation. Their remarks are occasionally at variance with the main evaluation report, and they take issue with some of the procedures used. Their report also contains a two and one half page section written by project

principals from the base hospital (MFGH). [99] Because these views are of significant interest to this study, extensive quotations have been taken directly from the statement:

> "The medical staff at MFGH and Kashechewan had a somewhat different view of the telemedicine program. ... Programming was the most difficult and time consuming part of the project. . . It was difficult to achieve a balance between collecting data, filling out the evaluation forms and providing telemedical service. One slightly disturbing feature was the apparent necessity to fill all available transmission time with data. Personnel at MFGH tried to cooperate in this regard but . . . occasionally were not able to conform...
> "It would not be unfair to say that the U-6 experiment interfered with the normal functioning of the hospital, Kashechewan Nursing Station and the James Bay health care region....
> "The project also interfered with the status quo of the hospital in that some permanent staff members had to dedicate significant portions of their committed time. . . The participants were continually plagued with evaluation; and data forms were filled out with varying degrees of punctuality and completion....
> "...the satellite supplied a more obvious service and luxury to Kashechewan Nursing Station than at Moose Factory due to the geographical location and related communications systems available. However, they were, , tardy . . . in the completion of data forms and appropriate evaluation material. . . .
> ". . .it is also fair to say that any operational telemedicine project used entirely for service and not taxed by the necessity to evaluate and to 'fill in' time has a strong likelihood of success.
> " It was quickly apparent that the patient benefited. . . from the radiological service [but] basically the program had lttle or no effect on emergency care. . . Transmissions benefited the patients mainly in a supportive manner for the physician. In this way, it might be said it was more beneficial to the physician." [100]

In the final evaluation report submitted by Roberts, Skene, and Lyons, Roberts presents his own history of the events

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[99] Ibid.

[100] Ibid.

surrounding the project in a preamble:

> " The association of researchers from McMaster University with 'Telemedicine' started in the academic year 1975/6 when Dr W. O. Spitzer. . . was commissioned by the Department of Communications to prepare an evaluative proposal. . .
> "Unfortunately, Dr Spitzer's contacts with the principal investigator in London were less than adequate from the start, and this, coupled with general overcommitment, caused Dr. Spitzer to quickly relinquish his responsibilities for the project to myself. . .
> "In the spring of 1976 after the failure of both of the two main projects to attract funding via the usual research grant sources. . . the DOC made the decision to support the work out of departmental funds.. . DOC contacted our group with a view to us carrying out the evaluation. We were reluctant to take on this new work because we believed that responsibility for evaluation should <u>not</u> be separated from the responsibility to actually conduct the study.. . We believed that objectivity is a feature of the <u>design</u> of the evaluation and not its <u>implementation</u>.
> "We will leave a discussion of how we have interpreted this role [of 'independent' evaluators] until the last section of the report." [101]

Roberts goes on to list some factors which influenced the evaluation. Influx of new equipment and personnel simultaneously with the experiment may have had an impact. He also had planned his evaluation in terms to the communication link being a substitute for the visiting medical specialist, but discovered that the project was an add-on to the existing program of visiting specialists. As well, his evaluation proposal was changed substantially at an initial meeting with project leaders in London. The net results were to "increase the . . . . Transaction Data Form (TDF) to three pages from one. . . the omission or reinterpretation of some of the questions. . . [and]

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[101] Roberts, Skene and Lyons, "Moose Factory Project," Section 1, pp. 1-3.

the insistence that the TDF be used by the Kash nurses as well." [102]

All of these changes (to which Roberts agreed reluctantly) caused problems later on. For example,

> "During the course of the study it was suggested that the length of the form was inhibiting the flow of clinical information. . . .As a result a one page version was introduced." [103]

Roberts frankly acknowledges that

> "Some of our evaluative proposals simply didn't 'pan out' when the time came to implement them. Chief among these was the plan to look at the timing of admission, consultation and discharge with the idea that more available consultative support might reduce the time between admission and the introduction of appropriate management." [104]

The most significant concern raised by Roberts refers to the resignation of the MFGH project coordinator mid way through the project, in December 1976. An earlier report, contracted by the DOC to a London consulting group suggested a jurisdictional dispute was the reason. Koba claims it had never been established who was in charge. Dr. Baxter (who resigned), under contract from Health and Welfare Canada, reported to Dr. Kempton, the Medical Administrator of MFGH, but Drs. Carey and Russell were in charge of the experiment. Dr. Baxter as

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[102] Ibid, p. 5.

[103] Ibid, p. 5.

[104] Ibid, p. 6.

coordinator had infused a great deal of energy into the project.[105]

Roberts described the withdrawal as a falling out with the principal investigators– a dispute which "appeared to have many facets" with the main one "the balance between the need to respond to the requirements of MFGH and the need by UH to 'experiment'." [106] Carey and Russell described the resignation in terms of a professional disagreement over procedures of the experiment.

Evaluation

The evaluation study done by Roberts and associates is contained in a one hundred and eighty-five page report consisting of six sections, one each for: the preamble, the analysis of the transaction data, the post-study interviews, the evacuations, length of stay, community interviews, and the concluding remarks.

No theoretical perspective or framework is provided. A discussion of the methodology is confined to the procedures and instrumentation, particularly the TDF.

Transaction Data Form

[105] Koba, "Hermes U-6," Report No. SACDA-77-9.

[106] Roberts, Skene and Lyons, "Moose Factory Project," Section 1, pp. 1-3.

Material presented by Roberts includes twenty-four tables reflecting data which represents the respondents' own judgement on items such as the quality of communications facilities, the medical usefulness to patients, the change in management of the patient's disorder, and the project's usefulness as a learning experience. There is even an item rating the overall gut reaction to the process.

A content analysis of the audio transactisns from Kash was done, and the log of transactions as recorded for each event was accumulated and presented. No statistical analyses are done except for percentage calculations, since the number of respondents varies in each case.

Interviews

Skene, as co-evaluator, conducted interviews of participants who had been involved with the initial planning and who had participated in at least one transaction. Interviewees included twenty-three MF and twenty-three London respondents representing a variety of health professionals.

The interviews centred on what Skene calls 'research questions' some of which are reproduced below:

1. was the satellite an effective medium?
2. how did respondents perceive the impact of telemedicine on patient care?
3. how did the respondents perceive the reaction of patients to telemedicine?

4. could telemedicine fit into the respondent's regular clinical routine?
5. what are the respondent's views on the future of telemedicine?

Skene records a wide variation in responses to each question. A similar set of interviews was conducted with twenty-seven of the same participants following the completion of the experiment. Skene reports on the open-ended comments regarding strengths and limitations of telemedicine, and compares the before and after responses. The content is pertinent to this study and is therefore presented here is some detail, using direct quotes from Skene's text:

> "It appears that the experiment was successful in answering the respondents' initial questions relating to the technical feasibility of using a satellite to transmit 'hard' data . . .
> "However, by the 'after' interview, the concerns seem to shift. The inability to relate technological achievement to patient outcome was a major concern in the after interview. It was questioned whether telemedicine could be used to provide better patient care than the existing health care system.
> "It was suggested before the experiment that telemedicine may not be the most desirable but it may be the best alternative to the present health care system. In the after interview the opinion had changed a better alternative would be to hire doctors at higher salaries to ensure a person on site.
> "Respondents who questioned the cost/benefit relationship of telemedicine before the experiment questioned it even stronger following their experience with the system. Some who did not mention it before, later became concerned about the justification of the cost for the communications system. More suggestions were made to use the money to train and hire full time staff for remote areas. The need for in-person health care was mentioned more often after the experiment....
> "In comparing the respondents' program objectives before and after the experiment, it is more notable that approximately half of the respondents modified their

original objectives to make them more realistic...." [107]

In her concluding remarks, Skene states that

> ". . . success with the experiment did not prevent people from recognizing some of the limitations of telemedicine and expressing some concerns for its future development. Many people felt that telemedicine was still in its infancy and required careful evaluation in relation to relevant health care factors before it can be seriously considered for implementation." [108]

Skene lists some of the factors which might affect policy decisions regarding the introduction of telemedicine in remote areas. These include:

1. human resources availability in the future
2. health care needs of remote areas
3. long term effect of telemedicine on patient care
4. the changes which would be required in the present health care system to accomodate telemedicine
5. the cost of satellites

"Telemedicine," Skene concludes, "cannot be considered as an entity in itself. It must be considered in relation to the existing health care system, the population it is intended to serve, and the resources. . . upon which the innovation will draw." [109]

Conclusions

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[107] Ibid, Section 3, pp. 63-66.

[108] Ibid, p. 67.

[109] Ibid, pp. 69-70.

In a final section , Roberts presents a wide range of conclusions, some of which are quoted here because of their relevance to this study.

About the role of evaluators, Roberts sees himself as presenting the data in an "unbiased fashion" and trying not to "pass judgement on this project." He adds that, where appropriate," we have offered our own interpretation of data summaries." He also states that "it must be emphasized that these are personal suggestions of no particular weight." Carey and Russell, in their report, state the "pre and post interviews of the project participants provided a good cross section of subjective response and undoubtedly generated useful ideas concerning future programs." They hasten to add that

> "On the negative side, too much emphasis was placed on generating subjective data (with shades of meaning) which was difficult to evaluate. The evaluation form was long and involved; the evaluation of the 'medium' and the response to the 'medium' at times tended to overwhelm the fundamental purpose - the measurement of the practice of Telemedicine. The busy telemedical consultant did not long suffer the tedious task of wading through the subjective evaluation section of the form . . . ." [110]

Roberts labeled the project a demonstration of feasibility rather than a controlled experiment to test hypotheses, and suggests that his concluding comments (which he calls personal views) are offered because they might be important to future developments.

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[110] Carey and Russell, "A Telemedicine Experiment," p. 87.

Roberts feels that the experimental nature of the project led to undertain conclusions regarding utilization and that a "spectrum of motivation" was evident for each transaction, representing the agendae of the various principals involved. There was even a possibility that a certain amount of unneccesary medical work (drummed up work) was carried out to fill time on air.

In answer to his own question about where is telemedicine going, he thought "real medical services can be provided or enhanced by remotely situated physicians linked by a communications system" but "perhaps Moose Factory General Hospital did not need such elaborate general medical support." [111]

At a debriefing session for Hermes experiments held in 1977, Roberts stated unrealistic hopes had been placed in evaluation. [112] This subjective-type evaluation, severely criticized by project principals, nonetheless helped to show up a number of flaws in the evaluation paradigm and in the inappropriateness of program evaluation to assess the impact of such innovations as telemedicine, for a number of reasons. subsequent chapter.

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[111] Roberts, Skene and Lyons, "Moose Factory Project", Section 5, p. 6.

[112] Jelly, "A Report on the Process of Implementation of Hermes Experiments," CRC Technical Note 694-E.

IV. The Anik-B Pilots

While the Hermes experiments were exploratory, temporary demonstrations, the Anik-B projects were meant to be pre-operational, as explained earlier. This thrust is reflected in the program's objectives, listed in Part I above.

Anik-B was launched in December 1978, the world's first hybrid satellite, carrying twelve channels in the six-four GHz band, six in the fourteen-twelve GHz band. Telesat Canada leased to DOC all of Anik-B's fourteen-twelve GHz capacity for sixteen pilot projects over a two year period. The lease was later extended to carry out nineteen pilot projects, some of which were extensions of those begun in the first two years. [113]

> For the Anik-B program, DOC made available satellite time, equipment, technical advice and other assistance to a range of pilot project sponsors, [for] . . . . community communications, tele-education, telehealth, business and government communications and technical experiments." [114]

John Chapman, speaking at an Anik-B information exchange meeting held in Ottawa prior to the launching of Anik-B, in October 1977, explained the difference between Hermes and Anik-B projects:

> "The Hermes experiments demonstrated the application of satellite communications to health care delivery,

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[113] Government of Canada, Department of Communications, Anik-B , (Brochure), Ottawa, D.O.C., April 1982.

[114] Ibid, p. 6.

education, community development, public administration etc....
"To the DOC these experiments have demonstrated significant interest by user groups in the public services sectors in testing and developing new services utilizing satellite technology." [115]

Going on to stress, in practical terms, the DOC's agenda for Anik-B pilots, Chapman stated:

"Let me underline again, that it is our goal to provide the opportunity for you to test, in a rational process, the utility of telecommunications in the delivery of new services, it is not to convince you of the operational desirability of these services....
"In many instances, 'satellite' could be replaced by 'telecommunications' as the underlying processes for users are the same." [116]

Further,

"DOC is not in the business of establishing a subsidized satellite system in the future, where free-of-charge services will be provided. In the post Anik-B phase, satellite services will have to be sought by the users in appropriate arrangement with carriers." [117]

And finally,

"The Doc understands its role as that of a catalyst and as such it will do its best to see that demands and expectations which were created in the Anik-B project can be carried out in an operational system." [118]

Pilot project proposals were to be submitted to the DOC who would select the appropriate ones, but "project participants are expected to bear costs for project development, operation and

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[115] John Chapman, "Anik-B Program Objectives," at an Anik-B Information Exchange Meeting, Ottawa, 25-26 October 1977.

[116] Ibid.

[117] Ibid.

[118] Ibid.

evaluation." [119]

A significant portion of this meeting was indeed devoted to the subject of evaluation. Casey-Stahmer presented an informative overview. She began by stating that she had encountered (as the DOC officer in charge of evaluation) three philosophies with regard to the role of evaluation in program planning: evaluation means being criticized, means extra work, or helps me to answer questions about the project. She concluded that planners and policy makers alike need to depend on a sound evaluative basis to weigh the pros and cons in decision making.

At a subsequent Anik-B users' meeting held in June 1980, Alex Curran, assistant deputy minister, Space Programs, DOC, spoke plainly and directly regarding the role of program evaluation in relation to Anik-B pilots. "As taxpayers," he said, "we have all rebelled against the overly extended continuation of some government programs. That rebellion has resulted in the adoption of a sunset type of program evaluation." [120]

At this same meeting, N.G. Davies repeated the program goals for Anik-B and gave a report of the status of proposals for pilots:

> "In total, thirty-six proposals for projects were received. nineteen were approved in principle. Of these at this time, there are fourteen active projects. . . two are in a hold category until they are better defined

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[119] Ibid.

[120] Summary Record of the Anik-B Users Meeting, Ottawa, 5 June 1980, p. 3.

and three have been withdrawn." [121]

The Montreal-James Bay pilot telehealth project received approval and is described in the next section.

The Montreal-James Bay Telemedicine Project

Information for this study has been drawn from a number of sources, both published and unpublished. [122]

Background

At the onset it should be noted that the province of Quebec has always had an interest in the transmission of x-rays over long distance, due to the early pioneering efforts of Dr.

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[121] Davies, N.G., "Project Status Report," Summary Record of the Anik-B Users Meeting, pp. 4-14.

[122] F.A. Roberge, "La Medecine des Grandes Distances," Prospectives et Sante 15(1980); ——, "La telemedicine au Quebec: liaison entre le complexe La Grande et Montreal par le satellite Anik-B," Institut de Genie Biomedical, Universite de Montreal, Montreal, 1981; ——, "The Potential of Telehealth for Specialty Medical Services in Northern Quebec," Telehealth '79, Proceedings, Winnipeg, Man., 1979; F.A. Roberge et al. "Telesante: les telecommunications au service de la medecine et de la dispensation des soins," l'Ingenieur 227(May-June 1980):33-39; G. Page et al. "Teleradiology in Northern Quebec," Radiology 140(August 1981):361-366; "Telemedicine System for Specialized Health Care," Final Report submitted to Health and Welfare Canada, Ottawa, June 1980.
Interviews with Ms. Page, Dr. Sylvestre, Dr. Gregoire and Dr. Roberge, during a site visit in August 1981.
Correspondence received from health personnel at La Grande Hospital.

Jutras. [123] Secondly, they have become one of the centres of excellence in this country for the analysis of electrocardiogram (ECG) tracings transmitted over long distance and interpreted by computer at the Sacre Coeur Hospital in Montreal. Some twenty regional hospitals are linked in a network which provides instant analysis of the ECG tracing. Ironically, one of the pioneers of this system, a world reknowned cardiologist, was stricken with a heart attack at the outset, and the project became less oriented towards cardiology as a result of this man's withdrawal from it. The direction taken by the project might have been different had the principal investigator continued to be active during the whole of the project's life cycle.

Because this project was situated in the region called New Quebec, a considerable amount of public attention was focussed upon it. [124]

The Project

This project was initiated in early 1979. The James Bay Hydroelectric development in Northern Quebec, fifteen hundred km north of Montreal, was chosen as the target site. From April to September 1979, a two-way black-and-white closed-circuit

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[123] See history section at the beginning of this chapter.

[124] See Henriette Major, "Une aide medicale qui vient du ciel," Perspectives 21:8-10.

television network used Anik-B to link LaGrande Riviere Hospital in LaGrande (LG), and the University of Montreal, and two Montreal hospitals. Simultaneous two-way video required the use of two channels on the satellite.

The La Grande Riviere hospital centre is a small (twenty bed) facility providing services to the workers and their families who live in Radisson village in James Bay. During the first phase of the project, x-rays were transmitted and interpreted from the LG Hospital to the Radiology department at the Hotel Dieu Hospital in Montreal. Sixty-seven radiological examinations from the teaching files were first reviewed and interpreted by four different radiologists. Then, four hundred and twwenty-five current radiological examinations from the LG hospital were transmitted for interpretation. In total this required one hundred and ninety-three hours of telecasting. As well, one hundred and four hours of tele-education and consultations were carried out involving numerous health professionals at Sacre Coeur hospital. There were also experiments which were conducted from the faculty of dentistry at the Universite de Montreal.

In a second phase of the program, because the real-time bidirectional television was considered 'too costly', an experimental comparison was conducted using slow scan television (via telephone lines) to transmit x-rays. During this phase, hospitals in LG-2 and LG-3 were linked to both Sacre Coeur and Hotel Dieu Hospitals in Montreal. A combination of Anik-B

satellite and ground telephone channels provided the communication links ten hours a day. Eight hundred and twenty-three current x-ray cases from LG-2 and LG-3 were interpreted at a distance. Because of 'technical difficulties', the planned teleconsultation and tele-education program could not be carried out in phase two.

Evaluation

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The project's three components, teleradiology, teleconsultation, and continuing education via teleteaching had the following objective: "to examine the usefulness of audio and video communications with respect to various diagnostic and therapeutic actions," with the underlying hypothesis that the "health personnel from a specialized urban hospital can offer valuable support to general practitioners and nursing personnel working in an isolated location." [126]

No theoretical perspective was made explicit for this evaluation. The evaluator-researcher who conducted the evaluation study was herself, deeply involved in the project. This is possibly the principal reason why every effort was made

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[125]The full text of the evaluation report is in the French language. Therefore, no direct quotations are used; quotations presented here are taken from the English summaries.

[126]Fernand A. Roberge, "La Telemedecine au Quebec," Summary. (Montreal, Institut de Genie Biomedical, Universite de Montreal, 1981). p.6.

to conduct a methodologically correct study. Therefore an experimental design was implemented to report on the comparison of two technologies for the transmission of radiographs. Because the evaluator as researcher, was, in this case, more inclined to the laboratory model of research than to the social experiment, there was more emphasis placed on quantitative analysis than in other evaluation reports.

The following evaluative procedures were undertaken. For the tele-radiology component, the specific aims were to demonstrate the possibility of interpreting x-rays that have been transmitted (a) over a broadband channel in real-time, and compare these transmissions to (b) slow scan transmission, in terms of interpretation by a radiologist. The two systems were compared for transmission of some four hundred and twenty-five current radiological cases. Prior to this exercise a team of four radiologists were asked to interpret radiographic examinations taken from the teaching files, where the diagnosis was known. Sometime later, they were asked to read the same cases using television, rather than the usual direct viewing mode. The interpretations were reviewed by a fifth radiologist. These cases were selected to roughly correspond to the type of radiographic examination which would come from the LG population. The range in interpretation in these pre-selected cases was very small. When the current clinical cases were compared (TV reading vs direct reading sometime later), the study showed that again, there was only a small number of

variations.

In the second phase of the project, when slow scan TV was used and compared to broadband TV transmission, there was a significantly higher incidence of error, as can be expected due to the lower level of image resolution available on the system. The investigators concluded that slow scan television is not an adequate system for telemedicine. The image is of inadequate quality, and the time needed (forty to eighty seconds per image) is too long, especially in the case of emergency consultations. [127] An important finding was that radiologist performance improved with experience using the medium of transmission.

For the evaluation of the teleconsultation, Roberge and his associates sought to establish whether or not teleradiology was judged to be 'useful' by the general practitioner in James Bay, mainly in terms of confirming a diagnosis. They concluded that the availability of televised transmission contributed to sixty per cent of 'major decisions' taken on behalf of patients located at LG 2 and LG 3. [128]

Other teleconsultations included some held between the LG-2 general practitioner who consulted with a specialist for a

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[127] Although eighty seconds does not seem like an inordinately long time to transmit an image, the time is indeed long when the full image has to be cleared before the next radiograph can be transmitted. This time-span seems excruciatingly long in an emergency or when one considers there are always at least two radiographs per examination, very often three or four.

[128] In a later phase of the project, two small remote hospitals were linked to Montreal, one at LG-2 and one at LG-3.

variety of consultations such as dentistry, trauma, cardiology, psychiatry, neurology and obstetrics. There were twenty-seven consultations in all.

The tele-education aspect of this project involved continuing education courses in nursing, community health, trauma, mental health, and others, for a total of under one hundred hours. A total of five hundred and twelve participants completed four hundred and eleven questionnaires which evaluated whether or not objectives had been met, along with their perceived quality of content, participation in, and organization of the program. Some consultations and courses were held over the slow scan medium but they do not appear to have been evaluated.

In their summary,[129] the project leaders drew the following conclusions:

> "This project allowed us to demonstrate the usefulness of a telemedicine system in teleradiology, teleconsultation and tele-education. Due to a number of technical difficulties our effort was focussed on teleradiology.
> "Real-time. . . television is ideally suited for telemedicine...
> "Continuous audio-visual interaction favors easy, pleasant and efficient human relations.
> "Slow scan television through telephone lines does not allow to realize a fully adequate telemedicine system. The low image resolution. . .[and]. . . the lack of a substantial audio-visual interaction makes teleconsultation and tele-education activities awkward and difficult.
> "The advantageous solution offered by real-time television is defeated by its prohibitive cost when fairly long distances are involved. . . .
> "Digital transmission of images, coupled with a flexible

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[129] Fernand A. Roberge, " La Telemedecine Summary,", p. xv.

image storage and handling system, appear to be essential elements of a cost-effective telemedicine system." [130]

Anik-B Overall Evaluation of the Pilot Projects

The overall assessment of all the Anik-B projects was conducted by two consulting firms, DPA and CPER, [131] and was concentrated on the contributions of each of the fourteen pilot projects to the four DOC goals of the program as reported by the project participants. The pilot projects in phase one occurred between April 1979 and March 1982. The reported effects were then assessed further focussing on three project characteristics which were responsible for achieving the effects. The characteristics are:

> "the extended period of 'hands-on' experience afforded by the pilot project;
> the high profile nature of the Anik-B communications program;
> the particular characteristics of the fourteen-twelve

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[130] As a result of this pilot project, the research group applied for funds to conduct experimentation for the transfer of digitized radiographic images, but were not successful in obtaining funding for this research.

[131] Information for this review was gathered from the following: I. Bischof et al. "Anik-B Program Delivery Pilot Project: a 12-month Performance Assessment," CRC Report No. 1349, Ottawa, December 1981; CPER Associates, "Evaluation Assessment of Phase Two of the Anik-B Communications Program," Ottawa, March 1982;DPA Consulting, "Evaluation of the Anik-B Communications Program: Phase One," Summary of Findings and Conclusions, Vol. 1, Ottawa, August 1982; "Details of Findings and Conclusions," Summary Record of the Anik-B Users Meeting, Vol. 2, Ottawa, 28 October 1981.

Interviews were conducted with selected DOC officials, including W.T. Kerr, and J. Palmer.

GHz band used in the projects." [132]

The DPA report contains a section devoted to the Montreal-James Bay project in Volume Two. In essence the DPA report concludes that a bibliographic search showed that the Montreal study did not contribute 'new viability' knowledge, since such experiments had already been conducted, yet new hands-on experience was obtained through this project. New government contacts were established at the provincial level, multidisciplinary groups were formed, and professional interest in teleradiology was raised.

The DPA evaluation makes explicit its role is not to answer such questions as:

> " As a model of government intention to achieve industrial and communication goals, how does Anik-B compare with the alternatives?', or, 'What was the opportunity cost of particular pilot projects or forms of program activities?', or 'What would the results have been under different levels of program funding'?" [133]

This type of abdication of any responsibility towards other program realities and effects is a common defect in program evaluation as described earlier. It is essential to limit the evaluation activity to manageable proportions, so DPA was forced to leave out of its study a variety of issues and more importantly, the rationales which underlie satellite development for such service applications. However, the study presents a comprehensive picture of the moving target of communications technology-in-change and its surrounding environment, and

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[132] DPA Consulting, "Details," Vol. 2, p. 10.

[133] DPA Consulting, "Program: Phase One," Vol. 1, p. 7.

illustrates well the dilemna posed by evaluators, as mentioned earlier. [134]

The overall evaluation was conducted in two parts, corresponding to Phase One and Phase Two. For purposes of the current study, the review is concentrated on the evaluation of fourteen of the projects in Phase One, which included an assessment of the two above-named telehealth projects.

The evaluation was conducted by DPA consultants. Of importance to this study are the procedures, and the findings for the evaluation carried out on the telehealth projects, of which there were two: one at Memorial University, which has not been described as part of this study, for reasons given earlier, and the Montreal-James Bay project, which has just been reviewed.

Summary

Proceeding from a history of telemedicine in general, and satellite telemedicine in particular, the story of Hermes-CTS and Anik-B social experimentation is told using a case study approach. Three telemedicine projects are factually described with particular attention being focussed on the source documents

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[134] An evaluability assessment study, conducted by DPA Consulting prior to the conducting of the actual evaluation, outlines the aspects of the project which are selected for evaluation. Underlying perspectives motivating the choice are made explicit. Unfortunately, this pre-evaluation report had not been made public at the time of writing.

reviewed, especially the evaluation reports.

In the first study, the MUN telemedicine project, the method of evaluation used was guided interview and questionnaires seeking participant opinion on the educational aspects and the perceived value of the satellite project as a social innovation. Opinions were tallied, summarized and subjected to a variety of statistical manoeuvres. The theoretical perspective made explicit was that provided by a model of implementation of innovation as change, always as perceived by the user. A subsequent overall Hermes evaluation used the Stufflebeam framework [135] which leads to a decision making process based on information gathered through evaluation (evaluation is a function of decision making).

The second experiment was evaluated without theoretical perspective made explicit. Interviews and questionnaires were used to define the value of a broadband system, linking two remote Ontario sites to a University Hospital in Southern Ontario. This project was characterized by conflicting agendae which did not surface in the results of the evaluation, but manifested themselves at various stages throughout the study. The project leaders' report appeared to be at variance with the evaluative reports. Interviews and questionnaires were used to gather data about this project, which was more oriented towards teleradiology and the delivery of health care than the delivery

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[135] The Stufflebeam framework has been described earlier in this chapter, in relation to the Richmond-Daniel evaluation of the Hermes experiments.

of education. The MUN project had been more focussed on distance education.

A third telemedicine project, or pilot, took place on Anik-B and again contained a significant teleradiology component to link Montreal to two remote sites in Northern Quebec. In this experiment, the objective made explicit was to study the impact of telemedicine on health care personnel and health care delivery system to remote areas. The evaluation gathered two types of information: (1) experimental data relative to the diagnostic accuracy and agreement between radiologists interpreting radiographic examinations transmitted by two different communications media, and (2) impressionistic data or opinions about the teleconsultation and tele-educational aspects of the project.

An overall evaluation of this project sought to fit the experiment into the larger context of other Anik-B pilot projects, as an aid to decision making.

The information presented in this chapter has been based on source documents and interviews, placing emphasis on the evaluative component of each project studied. Although it is difficult to draw general conclusions from the diversity of material presented in this chapter, a number of common strands emerge throughout each of the projects, experiments or pilots, which have been reassessed in this chapter. In the chapter which follows, the assumptions and implications shown by the meta-evaluation presented in this chapter are discussed more

fully, within the context of a critique of program evaluation.

D. Chapter Four: Telemedicine Evaluation: A Critical Assessment and a Revised Approach

Introduction

This chapter begins with a review of literature which reports on the evaluation of selected Canadian and US telemedicine projects other than the satellite projects described in the previous chapter.

Material for this review was selected from an extensive bibliography prepared by Roberts and Picot in 1981.[1] This bibliography was incorporated in a more recent publication by Picot and Roberts (1984). The review is meant to be representative, and not comprehensive. It is based on the selection of at least one published or unpublished report, article or paper for each one of the telemedicine or telehealth projects listed.

This review provides additional background to the questions which emerge in the first case study. Some of the same evaluation difficulties, complexities and problems surface in this review which were in evidence in the case study developed in Chapter Three. Some authors offer solutions to the problem of

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[1] Judy Roberts and Jocelyne Picot, A Telehealth-Telemedicine Bibliography. (Ottawa: Canadian Medical Association, 1981).

evaluating innovations, particularly the problems related to methods. These solutions do not address the fundamental problems which lie in the implicit assumptions found in the act of evaluating itself, as mentioned in Chapter Two. First, the evaluation expresses some set of values. Secondly, the choice of methodology is an expression of bias: professional, political, and/or philosophical. A third problem exists in the context or the environment where the evaluation activity takes place.

To evaluate a program requires an acceptance or at least an understanding of the paradigms from which the program springs. A program, project or experiment must be fitted to an existing structure or system. The context may be medical, educational, social service, business management and so on. The context can just as easily be a corrupt government or a military establishment or any other environment. To be efficient, the program must enable and not conflict. In the presence of conflicting paradigms, the evaluation method chosen must necessarily be congruent with the conceptual biases particular to one of the schools of thought.

As an example, in the health care world, a familiar paradigm duality is that which is often referred to as the health/medical paradigm. The medical paradigm is one which is generally described as having an illness focus. Medicalization is used to treat the illness. The health paradigm seeks to increase individual health by focussing on illness prevention and promotion of health through lifestyle, nutrition and the

like. A predominating professional bias, in this case, the medical paradigm, can govern the conduct of the evaluation process in a fundamental way, since the evaluator must address the problem of the program's efficiency, and not the problem of its rationale.

A review of such biases either of the professional variety, or of the pro-technology variety (in the case of telecommunications technology projects), is beyond the scope of this study. Nonetheless the bias forms part of the basis for questioning the role of evaluation, and for suggesting a revised approach to the problem of introducing technology in health care

The concerns raised above are discussed more fully in the second part of this chapter, using as points of departure, the first case study studied in the previous chapter, as well as the review presented at the beginning of this chapter. The discussion and analysis of the second part of the chapter sets the stage for the development of a revised view or approach for introducing and assessing communications technology in the health care sector. The term approach is used throughout instead of the terms model or method as a more global term, encompassing many of the phases involved in technological change, from needs determination to assessment and evaluation. The approach recommended allows for multiple perspectives, since the health care field is complex and multidimensional. In a subsequent chapter, this approach is partially tested in a contemporary example.

I. Part One: Selected Review of Telemedicine Evaluations

Canadian Projects

This review focusses on evaluation reports in the period 1972-1981, the span of time which corresponds to the implementation and evaluation of the Canadian satellite projects reviewed in the previous chapter.

In a bibliography assembled in August 1981, [2] the literature reviewed showed telemedicine projects had been initiated in five Canadian locations. Three of these were reviewed in the previous chapter. The other two took place in Ontario's Sioux Lookout Zone and in the Baffin Island Zone.

The University of Toronto Study

The University of Toronto telemedicine experiment began with a study to compare four different communication systems for the transfer of health information for diagnoses, patient care, and continuing health and medical education. An operational system was the eventual outcome of this study. The study is perhaps the only Canadian example of a longitudinal telemedicine

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[2] Roberts and Picot, Telehealth Bibliography, 1981.

or telehealth study which succeeds in passing all of the usual tests for experimental rigor and scientific credibility. The purpose of this brief review is therefore not to question the integrity of this study, but rather to shed new light on issues and underlying perspectives associated with introducing and assessing this type of technology in the health care sector.

The operational system now links, via telephone channels and slow scan terminals, two Toronto hospitals and the Sioux Lookout Zone. The Zone covers an area of some two hundred and eighty-five thousand sq km in northern Ontario, with ten thousand native people living in twenty-seven remote communities. [3] The administrative centre for the Zone is the seventy-bed Sioux Lookout Zone Hospital, located in a town of thirty five hundred people. Seven of the communities have nursing stations, staffed by nurses. The others are staffed by health care aides. Family physicians, specialists and medical students from the south visit regularly. As with other northern regions, there are few roads and transport is mainly by plane.

In an early phase of the project, a six month experiment was conducted to compare four communication modes for the

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[3] Information for this review was gathered from interviews with project principals, including personnel at the remote site, the physician in charge of the project and all of the study's investigators. Site visits were made to the Toronto hospitals and to the management sciences department, University of Waterloo, where two of the investigators were interviewed. The statistics quoted in this first section are taken from an article by E.V. Dunn et al. "Telemedicine Links Patients in Sioux Lookout with Doctors in Toronto," Journal of the Canadian Medical Association 122(February 1980):484-487.

transfer of medical information. The results showed no significant differences between the modes for more than one thousand patients studied. To investigate the systems under real rather than simulated conditions, a two-year study was carried out which later developed into an operational service.

In the second phase, each patient was seen in the face to face situation and also via telecommunications. Diagnoses, tests, and patient management were recorded and coded into one of sixty-two categories. (Dunn, Conrath, Bloor, and Tranquada, 1977). Again, no significant differences were noted when the data were compared for mediated and unmediated situations. Attitudes of providers and patients were probed using questionnaires. The investigators found a high proportion of unqualified acceptance for the communications system.

The Higgins study (1981) [4] used a patient trajectory analysis as the analytical tool to study the same telemedicine system. This model was first described by Bennett and Rockoff. [5] An implicit underlying hypothesis is that high technology plus lower skills would be equivalent in some to-be-defined sense to low technology plus higher skills. The patient trajectory refers

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[4] Christopher A. Higgins, "Analysis of a Remote Health Care System with Telemedicine" (Ph.D. thesis, University of Waterloo, 1981). Much of the same information is available in the more recent publication by David W. Conrath, Earl V. Dunn and Christopher A. Higgins, Evaluating Telecommunications Technology in Medecine (Dedham, MA: Artech House, 1983).

[5] M. Elton, W.A. Lucas and D.W. Conrath, eds. Evaluating New Telecommunications Services (New York: Plenum Press, 1978), pp. 79-106.

to the path a patient follows as he interacts with the health care system. It is believed by the authors that the patient's travel through the system can be reduced and made more efficient through the introduction of telecommunications technology.

A series of analyses are done to determine what impact the introduction of any technology would have on the trajectory. Higgins' rationale for using the model is stated simply:

> "For years, health care evaluators have felt that this type of analysis is essential to a better understanding of health care delivery. . . . most quality of care measures based on outcome require a form of trajectory analysis since the subsequent health of an individual must be monitored to determine the effects of the medical intervention." [6]

Higgins, along with Bennett and Rockoff, thought the performance of a health care system could be measured along three major dimensions: access, quality, and cost. Higgins therefore evaluated the slow scan system linking the Toronto hospitals to the remote hospital, using the patient trajectory concept to analyze costs, efficiency, transfers and evacuations. He also probed the attitudes of health care providers. One of his main findings is that the patient trajectory analysis is an excellent tool for studying the health care system.

However, Rockoff and Bennett listed a number of limitations to the model. First, it trades off patient travel costs and telecommunications costs, dollars which do not come from the same source. The model also ignores psychological issues, is confined to the use of the technology in the medical care

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[6] Higgins, "Analysis", p. 107.

process, and is not outcome-oriented. Finally, they thought the trajectory method does not look at questions related to the overuse and underuse of telecommunications technology.[7]

In their most recent publication, Conrath et al. (1983) admit "We knew that the value of any given technology would be context-dependant. We did not effectively anticipate the differences in context between remote and urban primary care environments..." [8]

On the basis of their findings using this method, nonetheless, Rockoff and Bennett, as well as Higgins, thought that "telephone-based technologies should be vigorously and systematically explored."[9] Higgins recommended that the slow scan video system ought to be expanded to include other hospitals, and that patient trajectory analysis should be further expanded as an evaluation method.

Of the several limitations to the trajectory model not mentioned by Rockoff, Bennett or Higgins, one or two should be noted. First, there is implicit in this type of path analysis the notion that access to medical care increases health, and that the problem is one of finding more efficient ways to package and deliver medicine, (the term is occasionally used interchangeably with health). A second limitation lies in the absence in this model of patient factors not due to illness. The

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[7] Elton, Evaluating Services.

[8] Conrath et al. Telecommunications Technology, p 187.

[9] Elton, Evaluating Services, p. 103.

patient may be aged, handicapped, inhibited by the technology. Finally, the trajectory model does not forecast how the technology will fit into the health care system generally or be integrated in the environment in such a way that it can be introduced by placing user needs at the centre.

The trajectory model like the tracer methodologies familiar in medical auditing (Kessner and Kalk 1973) [10] fit a systems analysis perspective as a way of assessing aspects of the medical care system. In this case, resolution of the problem is defined simply as a point at which a patient does not return to the system any more. The trajectory ends there. Why a patient does not re-enter the system is not explained by the model. How well the patient becomes as a result of his various encounters with the system is not followed, for in the documentation of the trajectory, a prescription is often considered as its end point. It may well be that the trajectory is improved, but without much regard for the patient who is an object being moved through the system. Most important of all, perhaps, is the fact that the user's perspective (the aide, nurse, receptionist, or other front-line provider of service) is not taken into account. As Conrath (1983) states: "A technology does not stand alone. . . . Its use takes place in a social context, and has an effect on

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[10] Tracers are used in specific health problems to allow health care evaluators to pinpoint the strengths and weaknesses of a particular medical practice setting or an entire health service network by examining the interaction between providers, patients and their environments. David M. Kessner and Carolyn E. Kalk, A Strategy for Evaluating Health Services (Washington, DC: Institute of Medicine, 1973).

that system." [11]

The Baffin Zone Telemedicine Study

The Baffin Zone is located above the sixtieth parallel. Zone headquarters for medical services are located in Frobisher Bay in Northern Quebec. There are eleven nursing stations, seven of which are on Baffin Island. At the time of the study, there were four physicians in Frobisher Bay and none elsewhere. The medical services branch of Health and Welfare Canada is responsible for health care in this region. Primary care is mostly provided by nurses in the remote communities, along with native aides.

According to Martin[12] government officials had been concerned about communications capabilities of nursing stations in the far north. In June 1977, a joint study was undertaken between Health and Welfare Canada and the DOC. The objectives of the study were to make recommendations to improve the system and recommend alternatives to existing HF radio communications. Longer range objectives included the development of procedures to promote "the effective use of remote telemedicine

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[11] Conrath, et al. Telecommunications Technology, p 201.

[12] David Martin. "A Telehealth Experiemtn in the Baffin Island Zone" in Proceedings: Teleconferencing and Interactive Media (Madison, WI: University of Wisconsin, 1980), pp. 224-233.

systems." [13]

This exploratory descriptive study gathered both quantitative and qualitative data using a communications traffic log, questionnaires, and an operator checklist to identify routing of calls to and from the nursing stations and the Frobisher Bay Hospital. The study's findings are presented in forty-eight tables to show, for example, the number, quality and distribution of calls, the (self-reported) nature of the calls and what resulted in terms of patient handling for each call.

There was no underlying theoretical perspective made explicit in this study. The investigators found that "telecommunications must be fully integrated with the health care system as an instrument of health care delivery." [14] Alternatives would be to substantially increase travel and resources for physicians and patients. Another recommendation was that "a pilot project be undertaken in the Baffin Zone" [15] to try out a better system for communications since nearly forty per cent of HF radio calls were found to be unsatisfactory.

Following this study, an unsolicited proposal was submitted by Bell Canada and Telesat to test experimental telephones in the Baffin region. As a result of the tests, the Bell report

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[13] Jacques Langlois, Anna Case-Stahmer and H.J. Bagnall, "Baffin Zone Telemedicine Study - Final Report," Department of Communications, and Health and Welfare Canada, Ottawa, June 1977, p. 4.

[14] Ibid. p. 106.

[15] Ibid. p. 115.

identified equipment and client acceptance problems with the experimental system:

> "Voice activation requires rigid protocol sensitive to receptivity of personnel in remote areas. Some users were reluctant to participate fully in the experiment. Some users showed more interest and enthusiasm." [16]

Health and Welfare Canada officials disagreed with a number of the findings in the report. A revised report was therefore produced, stressing 'human factors' and the undesirable features of experimental telephones. [17] According to Martin (1979) "eighty-five per cent of the communications between nursing stations and base hospitals. . . can be satisfied by voice only" and "eighty-five per cent of the needs can be taken care of by fifteen per cent of the technology." As a result, Martin called for "further experimentation. . . to repeat and validate the knowledge that we already have but also to build up the personnel resource that are needed when telehealth takes off." [18]

Martin then recommended an evaluation model, represented by a three-sided cubic structure which would be the basis for a systems engineering model for evaluation. Like other

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[16] Bell Canada, "Final Report on the Technical Aspects of the Experiment on Baffin Island Entitled: The Effects of Reliable Telecommunications on Health Care Delivery to Remote Regions of Canada," transmitted to Health and Welfare Canada by letter, 28 May 1979, unpublished.

[17] Personal communication, official of the Telehealth Office, Health and Welfare Canada.

[18] Official of the Telehealth Office, Health and Welfare Canada, personal communication.

prescriptions put forward at this time for evaluation of telecommunications innovations, the model failed to be carried forward from the conceptual to the operative stage.

Evaluation of US Telemedicine Projects

In the previously mentioned bibliographic review some twenty four US projects were listed. (Roberts and Picot,1981) Because the current study centres more on the Canadian telemedicine scene, however, only brief reviews are provided of selected US projects, chosen on the basis of their similarity to Canadian projects, the scope of available documentation and evaluative activity,

Massachussetts General Hospital Project

One of the earliest telemedicine systems led to a report (Murphy and Bird, 1974) which compared, as did the University of Toronto study, one thousand patients seen by telediagnosis using a terrestrial link between Massachusetts General Hospital and Logan International Airport. Analysis of the "accuracy of the microwave transmission" was achieved by obtaining the "opinion of the responsible physicians and nurses and that of an independent observer as well as by analysis of the components of medical diagnosis." The report reached the conclusion that telediagnosis "can be used to increase the availability of

quality medical care." [19]

New Hampshire-Vermont Interactive Network

The New Hampshire-Vermont medical interactive television network in its first phase consisted of a twenty-eight mile link, over leased microwave facilities. From a special purpose network to be used for psychiatric consultations, it became a general purpose medical television network with an average of fifteen hours of interactive programming per week. [20]

To evaluate the system, the social interactions were studied focussing on the behaviour patterns of the participants with data collected by personal observation and interviews. A basic assumption was that the system would increase participant knowledge, which would be translated into better patient care, but the author claimed "the process is extraordinarily difficult to measure even under ideal circumstances. Public health statistics, a traditional measure, are not sensitive enough." Using both "structured and open-ended" interviews "characterized by a sense of informality".[21] and experimental designs which did

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[19] R.L.H. Murphy and K.T. Bird, "Telediagnosis: A New Community Health Resource," American Journal of Public Health 64(2):113-119.

[20] Dean J. Siebert, Development and Evaluation of a Model Interaction TV system, (Bethesda, MD: National Library of Medicine, Lister Hill Center for Biomedical Communications, 1972).

[21] Dean J. Seibert, et al. New Hampshire-Vermont Medical Interactive TV Network - Final Report, December 1974.

not affect relationships the investigators identified some so-called strategic issues, for example:

> "Attention must be given to factors specifically affecting interpersonal relationships: ego involvement, status consciousness, questions of authority and responsibility. An informed human-relations oriented person must be on hand to coordinate activities, obtain immediate feedback, cope with personality issues, and provide means by which participants can ventilate their emotional concerns. Special care must be given to program development since new or altered interpersonal relationships can emerge." [22]

The investigators and evaluators of the project report thought evaluation had to be very informal. The evaluator should be a trusted friend:

> "There is no substitute for those occasions when the evaluator could chat at length with users about [their] difficulties. . . . Such critical information could then be quickly acted on. . . . The evaluator was perceived by many users as a problem solver rather than a passive and critical observer of their efforts..." [23]

The evaluation methods in use were still felt to be primitive:

> "Despite the fact that there have been operational interactive television links for almost twenty years, practical and scientifically sound techniques for evaluating their impact remain to be developed." [24]

Moreover,

> "Almost certainly there is no way to conduct the

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[22] Dean J. Seibert, New Hampshire-Vermont Medical Interactive TV Network (Bethesda, MD: National Library of Medicine, Lister Hill Center for Biomedical Communications, 1972), p. 33.

[23] Dean J. Seibert, INTERACT: A Decade of Experience Using Two-Way Close-Circuit Television for Medical Care and Education (Bethesda, MD: National Library of Medicine, Lister Hill Center for Biomedical Communications, 1977), p. 64.

[24] Ibid, p. 62.

> evaluation of a large field trial in such a way that all those who are interested in the outcome will be satisfied. It is. . . imperative that the limitations of evaluation be recognized in order to avoid unrealistic expectations. "An almost overwhelming preoccupation with evaluation of federally funded programs during the 1970's as efforts were directed at identifying and curtailing unproductive expenditures... [showed]... many of these 'evaluations' were motivated more by political factors than by a concern for collecting valid data on which sound judgments could be made. Directors of operational demonstrations and those submitting new proposals were in many cases cajoled into attempting to evaluate outcome in terms of impact on morbidity and mortality, cost benefit and cost effectiveness, frequently within a one to five year period of support." [25]

An external evaluation was conducted on this project by Practical Concepts Incorporated (PCI), an organization which has enjoyed considerable experience in the evaluation of telecommunications projects. PCI concluded that Interact's project directors were change agents, therefore committed to the project, and as a result, had geared the evaluation effort to a very personal level, so that "the subtle as well as the more obvious barriers to use could be discerned and. . . overcome." [26].

Case Western Reserve Telemedicine Project

The Case Western Reserve University's telemedicine project was evaluated by Dean. The study he conducted examined the cost effectiveness of telemedicine systems. One of Dean's conclusions

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[25] Seibert, New Hampshire-Vermont Network, 1974, p. 62.

[26] Ibid, p. 62.

is that the availability of funding in the health care sector permitted indescriminate adoption of technological innovations such as telemedicine systems. He felt there were common misconceptions which led evaluators to evaluate poorly. One of these misconceptions for example is the view that "any change in health care technology that reduces labor requirements must be desirable."[27] In his report, he concluded that technological change in general had been poorly evaluated in the health care field. Also,

> "In an entirely new field, such as telemedicine, many technical and operational difficulties had to be mastered before the demonstration projects could be expected to offer opportunities for rigorous evaluation." [28]

US Satellite Telemedicine Projects

Veterans Administration Telemedicine Project

The satellite experiments in the US produced a number of telemedicine projects. The first satellite to be used for telemedicine was launched in December 1966 (ATS-1). One of the first to use the satellite was a Veterans Administration group headed by Shamaskin who eventually tested the widest array of telecommunications technology of any telemedicine project initiated to that date, including the satellites ATS-1,-3, and

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[27] Burton V. Dean, Cost-Effectiveness of Telemedicine Systems: Final Report (Cleveland: Case Western Reserve University, 1978), p. 73.

[28] Ibid, p. 72.

-6, and finally, the Hermes-CTS satellite. As well, an extensive planning stage was undertaken. [29]

The earliest experiment took place in ten of the VA's extensive network of three hundred and eighty three hospitals. The ATS-6 experiments involved thirty hospitals. There were several kinds of telecommunications events, including teleconferences, grand rounds shown over satellite, teleconsultations, patient education and a patient self-testing questionnaire administered using a computer network. These events were classed for evaluation purposes into two groups: one-to-many events, and one-to-one events. Data was gathered using forms distributed at broadcast times, questionnaires given retrospectively, and a variety of interviews at site hospitals. Impressions were obtained from the interest groups. On the basis of the results, the VA project was carried forward to the Hermes-CTS satellite stage, although the evaluation procedures had to be changed, and the equipment problems including satellite time-slot availability altered the project considerably. Project directors voted the project successful, but in a later assessment, it was judged that the satellite was not necessary for this project. Terrestrial lines could have been used.

Alaska Experiment in Health Care

[29] R.B. Shamaskin and D.E. Caldwell, "Veterans Administration Experiment in Health Communication on the ATS-6: Final Report", Veterans Administration, Washington, DC., February 1976.

The Alaska experiment in health care first began as a project which linked health care aides in remote villages to a public health service doctor located in Tanana via satellite radio (rather than HF). To evaluate this project a quasi-experimental before-after design was used. Statistics were collected one year before the project began, and comparisons were made with data gathered following the installation of satellite radio. [30]

According to Hudson

> "The evidence on the possibility of substituting communication for transportation was not definitive. Hospitalization did not differ significantly between satellite and non-satellite villages. "It was not possible to demonstrate conclusively in the ATS-1 experiment that better communication improves health care." [31]

The ATS-6 experiment was then mounted to gain "a more thorough understanding of potential applications." This experiment involved the transmission of video and audio signals for consultation, ECG tracings, heart sounds, and the outcome of the consultations were rated by outcome categories for patient handling.

Foote, Parker and Hudson [32]

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[30] Osvaldo Kreimer et al. "Health Care and Satellite Radio Communication in Village Alaska, Final Report of the ATS-1 Biomedical Satellite experiment Evaluation," Stanford University, 1974.

[31] H.E. Hudson, "Alaska Medical Satellite Experiments", paper presented at the ASIS 38th Annual Meeting Workshop on Satellite Medical Experiments, October 1975, pp. 6-7.

[32] Dennis Foote, Edwin B. Parket, and Heather E. Hudson, "Telemedicine in Alaska: The ATS-6 Satellite Biomedical Demonstration Final Report of the Evaluation of the ATS-6

were the outside team which evaluated the Alaska health experiment. They saw as the primary purpose the need to obtain information that is useful for improved planning of operational services. Space does not permit a full analysis of the outcome of these experiments, but the evaluators did point to the need for placing the evidence gathered during the project into a larger social context to help determine which features should be carried into operational service, which require further experimentation, and which should be dropped.

In a synthesis of final reports and evaluations of the ATS-6 satellite experiments, authors Filep and Johansen found that the Foote-Parker-Hudson study "was hampered by the limitations of a field trial and the need to get the job done." They found that the report made a number of recommendations that did "not seem totally justified solely on the basis of the procedures and data provided in the evaluation study." [33]

WAMI project

The WAMI project (Washington Alaska-Montana and Idaho) program was designed to test the feasibility of providing medical manpower to states which had no medical schools. Dohner, Cullen and Zinser evaluated the project, in the context of a

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[32](cont'd) Biomedical Demonstration in Alaska," Institute for Communication Research, Stanford University, 1976.

[33] R.T. Filep and P.A. Johansen, "A Synthesis of the Final Reports and Evaluations of the ATS-6 Experiments in Health, Education and Telecommunications," report for the United States Department of State, Agency for International Development, February 1977, p. 28.

great deal of controversy regarding the effectiveness of various communication technologies and used logs and questionnaires to obtain impressions about the project. They also analyzed certain interactions using the Bales observational schedule, a form of evaluation tool which had not been used so far. They found it "necessary to alter the evaluation plan several times in response to programming changes... [and]... It was not possible to use a classic experimental design because few of the assumptions required for experimental design could be met." [34]

In their report they stated:

> "Desired outcomes of such an educational experiment are rooted in societal values and are often difficult to precisely define and, at times impossible to express in measurable terms. There was some resistance to and anxiety about the use of the hardware that was used in the educational experiment." [35]

Summary of Part One

This overview of the evaluations of US and Canadian telemedicine projects has shown that a range of methodologies has been employed to assess the effectiveness of telecommunications to deliver health care information. None of the project directors, evaluators or investigators have

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[34] Charles W. Dohner, Thomas J. Cullen, and Elizabeth Zinser, "ATS-6 Satellite Evaluation: Final Report of the Communications Satellite Demonstration in the WAMI Program", Lister Hill National Center for Biomedical Communications, University of Washington, Seattle, WA, 1975, p.3.

[35] Ibid.

expressed total confidence in the methods they used to examine the projects. None of the projects drew firm conclusions about the possibility of their systems playing a role in improving the health of the remote populations, although most listed this as one of their primary objectives. Some projects drew attention to the need for further experimentation, based on the inconclusiveness of their results. A few did zero in on the need for better communications in certain remote regions.

The experiments and projects which are significant in this regard are those which took place in areas where unreliable communications exist for health care providers, for example, Alaska, and the Baffin Zone in Canada. We remain unsure how well the experimental systems were eventually integrated in to the environment of existing health care delivery since conflicting reports and anecdotal data have not provided firm evidence of system integration, as noted in this review.

From this review we can draw some tentative conclusions. First, it would appear that no evaluation method used so far is adequate for the assessment of experimental telecommunications systems. There are a number of reasons for this which are elaborated more fully in a future section of this study. Second, an objective implicit or explicit in these projects appears to be the need to go beyond the experimental stage either to the development of new experiments, based on the inconclusiveness of the findings of the first ones, or based on their success, to the operational systems. The project investigators all seem to

want to continue their experiments. Yet, few planning tools have evolved which would help decision makers choose the right systems, and the appropriate telecommunications projects which would improve communications in health care, or alleviate some problem with the delivery of care.

The review therefore leaves us uncertain as to the potential for improving health care through the use of telemedicine systems, particularly since the introduction of these systems and their assessments was often fraught with conflict, sometimes even producing contradictory findings. It is uncertain that the conflicts and the resulting confusion are due to the innovation (as change), or to the context (as multidimensional and complex), or to the technology (as inappropriate substitute for the face to face situation), or to the relative lack of feasibility study results (Conrath, 1983), or to the procedures (for evaluation and needs determination), which were used to examine the projects.

In the following discussion other problems are revealed, e.g., the inadequacy of the evaluation or assessment procedures for informing the implementation of operational systems. It is questionable that decision makers were able to actually use the evaluations results. This is in spite of the tentative findings, and the uncertainty of the procedures used to produce these findings. The scope of the current study does not permit a full examination of all of these aspects.

II. Part Two: Evaluating Telemedicine: Uncertain Art

This part of the chapter presents a re-examination of the procedures associated with the evaluation of telemedicine projects and experiments reviewed thus far, particularly the satellite telemedicine projects described and reviewed in the previous chapter. The re-examination focusses on a number of issues associated with the specific evaluations conducted. These issues emerge through problems associated with contextual definitions, with the methodologies used, and the assumptions underlying the implementation of the particular evaluation procedures chosen.

Assumptions and Guiding Principles

The term assumption is used here in the context of its commonsense definition to mean "things taken for granted" or "things taken to be true." This is the same definition adopted by House, in his writings about the assumptions which underlie the most commonly used evaluation models. [36]

In the telemedicine evaluation reports reviewed for this study, the underlying assumptions are occasionally stated, but often, they are not. There are a number of sources from which

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[36] Ernest R. House, "Assumptions Underlying Evaluation Models", Educational Researcher 7(March 1978):4-12.

the assumptions emerge. The unstated assumptions remain mute, not necessarily because there is some hidden agenda which is not to be revealed, but more often because these assumptions are woven so inextricably with the project's context and the evaluator's and/or project director's professional perspective and view of things, that it is very difficult for these investigators to stand back from the activity of their own research and view it as separate from the basic tenets which govern thought and method, theory and practice, in the environment of their work. This environment gives the experiment or project its genesis. It usually furnishes the supportive structure during the project's life. It often provides the rationale for the project.

In this situation the investigator-as-evaluator is like the scientist who has been educated in a certain scientific community which, when it is mature, and established, is endowed with historical rules, examples, applications and concepts which spring from its paradigms and guide its research activities. The notion of scientific paradigms has been introduced by Kuhn (1962) [37] and provides an explanation for the scientist, investigator or practitioner's acceptance and assimilation of those theories which govern mainstream practice and research in his own field.

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[37] Thomas Kuhn, The Structure of Scientific Revolutions, 2nd edition. (Chicago: University of Chicago Press, 1970).

In the practice of evaluating telecommunications projects, a number of contexts come into play. For the same evaluation, there may exist the biases of an educator, a physician, a social scientist and a communications specialist, each with his or her own scientific community. These primary stakeholders sometimes hold conflicting views and expectations for the experiment or project's outcome.

All evaluation activity is based on underlying assumptions (House, 1978, Guba and Lincoln, 1981), borrowed from other disciplines and fields in which evaluation is practiced. Weiss (1970) says that "very few programs are born without roots in the existing order of things." [38] To evaluate the telemedicine projects, investigators drew from a wide range of fields, especially medicine and education.

One guiding paradigm in program evaluation has been the setting and measurement of program objectives. The idea of objectives was introduced by Tyler in the late 1930s, who used the concept to develop curricula, the stated goals of which the learner must strive to achieve. [39] The rationale for objective setting was consistent with prevailing scientific thought. The concept has since been adopted in a range of practical fields, other than education, for example, in management (hence the idea of Management-by-Objectives) and in program evaluation. The

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[38] Carol H. Weiss, "The Politicization of Evaluation Research", Journal of Social Issues 26(1970):57-68.

[39] D. Hamilton et al. eds. Beyond the Numbers Game (London: MacMillan, 1977):29-34.

appeal provided by objectives is the scientific air of inquiry which their measurement aspect conveys. (Guba and Lincoln, 1981).

The concept of objectives setting gained early popularity in educational circles because it embodied subconcepts for (1) the development of curriculum, (2) the testing of students for achievement of goals set by curricula, and (3) the evaluation of the effectiveness of educational programs in providing the necessary conditions for producing the desired outcomes. This view of learning as the achievement of goals has been developed to a fine art by such writers as Mager. [40]

The goal theory has long been a guiding principle in educational evaluation. Essentially behaviourist in orientation, the goal statements, whatever their context, contain the built-in seeds for their measurement. Through practical tests which simulate the real situation, it can be established by observation or scoring that the student has achieved the desired level of competence to match the required objective(s). This process has provided evaluators with the opportunity to apply the classic pre- and post-treatment experimental design in program evaluation. This guiding paradigm was present, to a greater or lessor degree, in many of the telemedicine experiments reviewed.

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[40] R.F. Mager, Preparing Instructional Objectives (Palo Alto, CA: Fearon, 1962).

The overall goals for the social communication experiments using the Hermes satellite were sufficiently broad– as described in Chapter Three– that each experimenter could choose to set specific goals appropriate to his own context, within the parameters of the satellite experiments. Thus, for example, Pomfret (MUN) was to measure educational outcomes and Carey and Russell (UWO) wished to evaluate medical outcomes, while Richmond and Daniel in their overall evaluation, evaluated decisionmaking and acceptance of the innovation of the satellite technology. Roberge and his associates sought to compare (on the Anik-B satellite) the accuracy of radiologic diagnoses.

A number of practical problems emerged almost immediately, however, which interfered with carrying out the experiments as planned. First, the activities had to match the capacity, orientation, and availability of the equipment. Second, all of the satellite telemedicine projects experienced equipment difficulties and so some of the bestlaid evaluation and project plans had to be shelved: previous goals had to be abandoned and new ones drafted as the project evolved. Moreover, because of the north-south orientation of the satellite, signals (in this case, medical information) had to be oriented in that direction. Third, only one channel was available on the satellite for experimentation, carrying video oneway. Return video was not available. A return audio signal was made possible by land

lines. [41] It is in this sense that the technology had some influence in guiding the content and direction of the communications. The technological problems served to focus more attention on the satellite than on the human aspects, and this, in turn, absorbed much of the experimental momentum.

A second problem which altered the plan for the experiments was due to funding uncertainties. Thus, at the last minute, the content and the evaluation procedures had to be altered significantly. Certain stakeholders (for example, in the MUN experiment), withdrew their support leaving content of the project to be reoriented.

In spite of these problems, certain assumptions remained at the basis of the concept and design of these experiments. First of all, there is the assumption– at times explicit– in the distance education portion of all of the projects, that information delivered in this manner contributes to better medicine for patients in the remote regions of Canada.

There is no firm evidence to prove that information delivered via telemedicine improves medical care. Indeed, Conrath et al. (1983) report that "The proper diagnosis and appropriate treatment of a patient's medical problem is the key to effective health care delivery. But the results. . . indicate that this does not depend on the telecommunications technology

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[41] Although one of the MUN Anik-B experiments allowed for additional narrowband space for for a slow scan image to be carried from Labrador City to St. John's, Newfoundland.

used." [42] In two of the largest systematic studies reviewed (the Sioux Lookout study and the Massachusetts General Hospital study), the best that could be concluded was that the delivery of information was as good as the face-to-face variety. No such conclusion could be made with the satellite telemedicine experiments on the basis of their evaluation findings.

A second feature of this problem relates to the conviction held by medical practitioners in urban areas, particularly those associated with medical schools, that an extension of their knowledge, advanced degree of skill, and superior clinical facilities is needed in remote regions. Cowan, for example, makes the following comment about former telemedicine systems:

> "...existing telecommunications systems.... seemed to be structured so that the knowledge from a major medical centre or university could be distributed to those in the hinterlands. The flow of communication was primarily one-way with those in the field being given an opportunity only to ask questions. The concept that the rural setting may have information of interest to the major medical centre or university did not seem to have occurred to many....Nor.... ...did the fact that those in rural settings might want to communicate with just one another..." [43]

Cowan also thought that educational programs presented by some of the major medical centres, while interesting, were not applicable to the problems faced by rural practitioners on a daily basis. Health care delivery to northern Canada is a case

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[42] Conrath et al. Telecommunications Technology, p. 197.

[43] Robert A. Cowan, Planning and Implementing Maine's Interactive Telecommunication System: Development of cooperative Medical Education in a Rural Setting,Conference on Medical Care Development, Augusta, Me., December 1977.

in point. 'White man medicine' of the South has proved singularly ineffective against the overwhelming health problems of native people of the North, which are often due to conditions such as inadequate housing and nutrition. [44] There is also ample evidence which attests to the failure of modern, urbanized medicine to adapt to the health needs of native people. (Coburn et al., 1981). Good medicine does not always lead to better health. Wildavsky (1977), in his biting critique of the US health care system, points out:

> "According to the Great Equation, medical care equals health. But the great equation is wrong. More available medical care does not equal better health. The best estimates are that the medical system (doctors, drugs, hospitals) affects about ten per cent of the usual indices for measuring health: whether you live at all (infant mortality), how well you live (days lost due to sickness), how long you live (adult mortality). The remaining ninety per cent are determined by factors over which doctors have little or no control, from individual lifestyle. . . to social conditions... to the physical environment.... Most of the bad things that happen to people are at present beyond the reach of medicine." [45]

A second assumption is that the information transfered over the telemedicine system translates itself into the appropriate skills for the delivery of health care. The primary provider of health care in remote regions is the nurse located in the outpost, who, given the appropriate information, is often unable to act upon it, not having the adequate facilities for the treatment. This type of telemedicine system provides

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[44] Canada, Ministry of Indian and Norhtern Affairs, "Indian Conditions: A Survey," (Ottawa, 1980).

[45] J.H. Knowles, ed. Doing Better and Feeling Worse (New York: W.W. Norton & Co., 1977), pp. 105-123.

information, but not health care. (Brown, 1981). Even a sophisticated radiographic diagnosis delivered over the telecommunications system does not in itself provide the patient with relief– relief must be provided by another means, through some form of care.

A third assumption which is at the basis of much of program evaluation is that the results are generalizable to other situations in much the same way as the laboratory experiment is. Thus firm evaluation results are assumed to be usable in an operational context. Tentative results are assumed to require further research. It is never suggested that, from the beginning, the idea is unsound, and that a whole new redefinition of the problem is needed.

A fourth assumption is that which has been called the more is better perspective. An outcome of the results obtained from the telemedicine experiments was often that more telemedicine experimentation needs to be done. It is hardly ever suggested that a particular communication need does not appear to exist, or, if a communication need does exist, that another method or mode might be available to provide the communications link. Although, as Wildavsky points out, "there are always competing explanations about why policies fail." [46]

Often, certain, absolute explanations about the causes of illness and death are missing in the daily practice of health

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[46] Aaron Wildavsky, Speaking Truth to Power (Boston: Little, Brown & Co., 1979), p. 218. p 218,

care, leading to what Wildavsky calls the Medical Uncertainty Principle which states that "there is one more thing that can be done another consultation, a new drug, a different treatment. Uncertainty is resolved by doing more: the patient asks for more, the doctor orders more." [47]

A fifth assumption is that the important events of a telemedicine project are predictable and measurable. Much of what indeed happens is complex and unpredictable: this has been documented in all of the telemedicine reports and in debriefing sessions and conference proceedings. Indeed, the review of other telemedicine projects in part I of this chapter, underscores the changing nature of the events within the project. Out of a desire to study the manageable, a unit of the medical care system is selected: the transaction, the patient's trajectory, the radiographic examination and so on. This fragmentation necessarily prevents examination of other issues and aspects.

Two of the evaluation reports (Pomfret, and Richmond and Daniel) approached the evaluation question from the standpoint of its innovation aspect, focussing on the participants' acceptance of the innovation, as evidenced through their support for the project. In this, the evaluator equates the concept of innovation as change with the idea of innovation as value. It is important that barriers to acceptance be overcome, that the project receive participant support. The central theme of innovation-as-good seems to become the focus this particular

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[47] Knowles, Doing Better, p. 108.

perspective.

The logical outcome of a fascination with the novelty of technology in the health care field has led to a phenomenal growth and proliferation of medical technology, as several observers and investigators have reported. (For example, Wagner, 1979; Martin, 1980; Altman and Blendon, 1977.) If the problem simply resides in the barriers to innovation, then the nature, utility, and effect of the innovation is less important than the barriers to change and adoption.

Other assumptions which underlie the evaluations of these systems relate to the context in which the projects were introduced, as described below.

The Context

The health care system has a great many interdependant parts which often have linkages to the state and to educational systems, particularly, the universities. [48] In Canada, the linkage to the state is direct in the sense that facilities are owned by federal and provincial governments and the health insurance systems are managed by provincial governments. The health care system workers are trained and the health professionals are educated through government funding. Later, they are salaried or paid consultant fees by government.

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[48] John A. Denton, Medical Sociology (Boston: Houghton-Mifflin, 1978).

Physicians enjoy a high level of professional autonomy in this system.

The system is hierarchical. This is manifest in two ways: through the decision making processes where the level of legal and ethical responsibility for diagnosis and consequence of treatment rests with the physician, whose prescriptions and orders are carried out by professionals such as nurses and technologists. Decision making in matters of patient care rests with the physician, although in institutional matters decision making is in the hands of lay administrators and non-physicians.

The hierarchichal nature of the system is evidenced also in the number of levels of agencies which provide health services. In the usual situation, health care is the responsibility of a provincial ministry. In the North, health care provision is the responsibility of a variety of government bureaucracies. A person living in the North, if he or she is a native patient, is usually treated by a primary care provider (often a nurse) paid for by the Medical Services Branch of Health and Welfare Canada. Some of the related services might be provided through the Department of Indian Affairs and Northern Development. Depending on the location, a northerner's first encounter with the health care system may be through some branch of a particular provincial ministry of health (perhaps a public health office), but more often it would be at the outpost clinic.

From this primary encounter, the patient may be referred to the next level where one finds small base hospitals with limited

staff and clinical facilities. A referral from this centre may then be made to a tertiary level a more sophisticated centre with more specialists, even perhaps teaching and research facilities. Tertiary level centres are often associated with a medical school, of which there are sixteen across Canada.

All of the Canadian telemedicine projects in this country to date have found their original focus in a university faculty of medicine. [49] Within this hierarchical context, certain types of services, research and teaching are possible. The focus on illness and medicalizsation in the medical paradigm does not necessarily join well with a focus, for example, on holistic lifestyles, self-care, and non-traditional medicine, which might discourage dependance on the various structures of the health care system and encourage individual responsibility for wellness.

No health care system is completely free of the dual role: the provision of care services and the provision of health services. It follows that the introduction of telecommunications technology in this context will be at the service of one or the other of the paradigms, and that the evaluation or research will represent or promote that paradigm which has initiated and nurtured the project. In two of the evaluations (Pomfret, Richmond and Daniel), a good fit to the institution's objectives was seen as a measure of success for the project.

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[49] These are Memorial University of Newfoundland, Universite de Montreal, University of Western Ontario, University of Toronto, and very briefly, the University of British Columbia.

Another striking feature of the context of health care is its complexity. The linkages and the interrelatedness of the many parts and functions of the system contribute to its multidimensional aspect. This complexity is confusing to the nonmedical person who enters the field for the first time. There is, moreover, a great deal of specialization in medicine, involving the setting up of special terminology, protocols, training, and interdisciplinary boundaries which separate the health care system into service and professional units, each one with a separate but overlapping agenda. This complexity is exacerbated by a characteristic overlapping of issues and subcontexts in health care delivery. (Crichton, 1981).

Finally, the political context of telemedicine cannot be eliminated from consideration, although a thorough examination of this context is beyond the scope of this study. At an early stage of telemedicine development, the technology of satellites had not been tested for the delivery of services, but a great many interests were to be served if their introduction into the public service arena was judged to be successful. Early public statements about satellite power promised many things. [50] Successful health and education experiments would ensure the ongoing flow of funds in the direction of the space sector of the DOC, and enhance the communications side of satellite

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[50] For example, the Honorable C.M. Drury, "A Domestic Satellite Communication System for Canada," White Paper, 28 March 1968.

development, masking other possible agendae. [51]

There are also the politics of evaluation to consider. Although there is no evidence to suggest that evaluation results were manipulated in any way by government officials in order to draw positive attention to questionable projects, evaluation results, when they were produced, do not seem to have been used. Possibly because there were no comparable alternatives to test and evaluate, and each project was unique, making generalization difficult.

In the planning phase for the Hermes experiments (pre-1972), there was no official government policy in place regarding the evaluation of such programs. The policy was introduced in 1977, and had an effect on the Anik-B pilot projects. At this stage the failure of evaluation to produce conclusive evidence about the value of telemedicine may have served a function in motivating further experimentation. As well, the demonstration nature of the early experiments had the effect of guiding future applications. The very presence of research equipment raises interest, and proponents of the novelty often look for ways to apply the technology, rather than look for alternatives to the technology. Conrath et al. (1983) for example, found that "the presence of slow scan in the nursing station seems to have encouraged the taking of

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[51] Satellites were as involved in other programs related to surveillance and space exploration as they are in communications activities.

x-rays." [52] Studies of adoption and diffusion of high technology in medicine have already shown that the mere presence of the technology causes uses to emerge. [53]

Methodological Problems

The methodological problems encountered by evaluators of telemedicine projects are numerous and have been detailed in earlier sections. In spite of the wide range of methodologies adopted and utilized, none seem to have satisfied the usual standards required to develop firm conclusions. With the exception of the Conrath, Dunn and Higgins study reviewed earlier, which were not commissioned by a government agency, and the overall evaluations produced for the Hermes educational experiments and the Anik-B pilots, the methodologies used were not implemented with confidence by the evaluators. A review of the literature shows that the procedures were obtrusive, and often had to be altered considerably in the middle of planning or data collection.

The a priori goal model for the evaluation procedures recommended by government policy (1977) was not usable in the telemedicine projects due to their innovative nature, especially since effects emerged which could not have been predicted.

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[52] Conrath et al. Telecommunications Technology, p. 198.

[53] Gerald Gordon and G. Lawrence Fisher, eds. The Diffusion of Medical Technology (Cambridge: Ballinger Puglishing, 1975).

Impressionistic data were gathered but were often inconclusive. A prevailing paradigm may have guided the application of statistical procedures to some of the data collected, which did not necessarily add significance to the results. The application of statistical procedures do not make subjective survey data more objective, expecially when a relatively small sample is used for the database.

In the case of one of the projects, a strictly correct experimental design was applied (Roberge, 1980). [54] The findings produced confirmed what was already known about slow scan equipment (DPA evaluation report, 1982), and many of the important side effects of the experiment had to be considered once again using impressionistic data gathered from program participants.

Of the several possible explanations for the failure of evaluation to describe the reality of telemedicine, three have been singled out for closer examination. The first is that the context of the health care system is very complex, as stated above, and no evaluation tools exist which are sufficiently comprehensive to reveal a true picture of the interrelated events, when a communication system or network is introduced. Selecting parts for closer scrutiny fragments the reality.

The second is that evaluators have been bound to use tools borrowed from the worlds of education and the natural sciences

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[54] Although it appears not to have been intended for evaluation purposes.

to examine what is an innovative process in a human service context. These old tools have not been the most appropriate in the settings changed by telemedicine.

The third is that no firm connection had been established between the benefits of available information (by whatever means), and the process of medical care. This has led project directors to give preeminence to the technology rather than to its content, and has been accompanied by a tendency to study telecommunications projects and experiments as separate from context.

On the basis of this review, it is tempting to suggest that it is not possible to establish that there is a need for communications technology systems in medicine, nor is it possible to evaluate the usefulness of communications technology projects once in place. However, on the basis of the reported inconclusive results, both in this literature review and in the first case study, it is not possible to make such statements with any conviction. As well, it is not possible to say that communications systems improve medical care or provide a useful service to health care professionals and patients. What appears to be evident is that there is insufficient data to make firm statements either way. Even in the data intensive, rigorous, quantitative study they conducted, Conrath and his colleagues thought that "The large number of variables and the wide variety of contexts make it most difficult to claim that one's results apply to an environment other than that which existed at the

time and place of data collection." [55]

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[55] Conrath et al. Telecommunications Technology, p. 199.

III. Part Three: Towards a Revised Approach

Out of the ashes of previous telemedicine experiments and their evaluations arose prescriptions, admonitions, and critiques. [56] These can be grouped under three general umbrellas. In the first group we find those who would create better telemedicine systems through equipment design improvements (e.g., Roberge, 1979, Martin, 1979). Engineers, equipment sales and manufacturing firms, experimenters, technologists and seasoned, devoted users are in this group. As well we find proponents of telemedicine systems who would adopt different technologies to increase accuracy and/or cost-effectiveness. (e.g. Rockoff, as cited in Paghis). [57]

The second group of comments which arose out of the telemedicine experiments contained the many who would improve communications research rather than the equipment. In this

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[56] In the discussion which ensues, no distinction is made between telemedicine and telehealth experiments and projects. The applications for telecommunications in health care are all considered under the same conceptual and practical umbrella, using telecommunications technology to transfer some form of information between users who usually utilize special terminals, to include telemetry instruments and teleconferencing apparatus.

[57] The narrowband/broadband controversy, which has been variously described during interviews and in conference proceedings, came from this group. For example, see Maxine Rockoff, "Telecommunications Technology: Can it Lead to Health Care Delivery Reform?" Hermes-CTS, Proceedings of the Royal Society , Vol 1, pp. 65-76.

group, we find proponents of distance education, social scientists and researchers. Some thought better field trials should replace demonstrations, and futuristic planning techniques should be used to help users see the innovation integrated in their day-to-day environment. The largest subgroup included those members of the academic and scientific communities who wished to improve and tighten experimental design, and who offered a variety of prescriptions or models for implementing better evaluation and assessment techniques.

A third group which emerged was critical for various reasons. In this group, we find those observers concerned with the inappropriateness of satellite technology for health and education communications (e.g., Tremblay). Some thought that telemedicine applications were not the best use for telecommunications (Cowan, 1977, Reich, 1976). The introduction of telemedicine systems has not solved health care problems to date. We can speculate that because the idea of satellites for telemedicine was introduced from outside the sphere of health care, the systems had little hope of solving problems for they never became truly integrated into the health care delivery system.

Communications technology was often introduced into the health care field, as were many other technological advancements, without due consideration of the context. The context can be described as multidimensional embodying several levels. For instance, there is the level of the person, the

level of the organization and the much broader context, which is that of the political arena.

One is struck by the total absence in publications and the press of any comment about the failure of these systems to consider the needs of end users and their patients. [58] Thus, it does not appear that the systems were mounted to fulfill a recognized need from the perspective of the users who probably use information and communications in close association with direct provision of patient care services. This very fact may have been the primary cause for the failure of these systems to integrate fully into the health care system (as we discuss more fully in a later section of this study.) [59] This is not to suggest, however, that evaluation should be replaced by appropriate needs analyses techniques. For, as we suggest in the current discussion, techniques for the identification of needs is not the panacea that will lead to the appropriate introduction of the communications technology. [60] In fact, in this study, the idea of assessment, whether for needs or for technology, is considered as part of the same problem, that of introducing technology appropriately.

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[58] By end user is meant the actual nurse, technologist, patient and physician– usually at the remote sites– who is the primary receiver and transmitter of information (on behalf of the patient) to and from the distant centre and its specialist, instructor, or consultant.

[59] See Chapter Six.

[60] Patients in remote areas may be better off with local communication networks, as we have suggested earlier.

In the context of the case study presented in Chapter Three, the end users– nurses, patients, technologists and physicians– are treated somewhat as interesting objects in a test-tube relationship to the experiment. In educational programs, for example, their opinions as receivers are often probed by questionnaire. Otherwise, in the hands-on situation, they are often the victims upon which the systems are imposed. Their needs as communicators are rarely placed at the centre of the project's development. In most cases, the technology, not the user, takes precedence.

In this situation, the communications technology (i.e., the satellite) is treated as separate from the user, from the information to be carried and separate from existing traditional systems of oral and written communication, which are the predominating modes of communication in the health care field, according to Brown. [61] Experimental communications systems, such as the satellite telemedicine projects, were introduced in a context where formal and informal lines of communication already exist and have been the long-standing tradition.

Other than the problem of grafting a telecommunications system on an already well-entrenched oral and written tradition, a different order of problem is that presented by the evaluation itself. As we saw in Chapter Three,the evaluation procedures often added insult to injury. Beyond the obtrusiveness of the

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[61]J.H.U.Brown, Telecommunication for Health Care (Boca Raton, Florida, CRC Press. 1982).

communications hardware and the changes imposed by an unfamiliar communications modality, [62] a set of measures and procedures were introduced to study the impact of the communications system. The opinions of receivers of information were solicited, but their input often appears to have been an afterthought. We remain uncertain as to what role potential end users really played in the planning and the design of systems.

Planning and Needs

Several authors reviewed recommended that more effort needs to go into the planning of telecommunications systems. Tyler, for instance, was interested in the identification of needs in order to ensure the appropriate marketing of the technologies for communications. In a 1977 conference on the subject of evaluating new telecommunications services, he said:

> "Over the last ten to fifteen years, it has become... a truism that high priority should be given to the study of user 'needs'...for telecommunications and information technology." Tyler critiqued the field trial approach because often "it lacks the suitability for the derivation of generalizations." [63]

West, on the other hand, was specifically interested in the processes which need to accompany the introduction and evaluation of telecommunications technology in the public,

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[62] Note that in the case of satellite technology, it could hardly be described as user-friendly

[63] C.J. Elton, W.A. Lucas, and D.W. Conrath, eds. Evaluating New Telecommunications Services (New York: Plenum Press, 1978), pp.3-4.

rather than private sector.

> "The identification of the priority service needs of rural communities, based on a carefully planned and implemented needs assessment effort, is essential if the application of telecommunications technology is to be successful in meeting public service needs." [64]

Similarly, Kay and Kramer were concerned with assessing needs and attempted to develop a method for the purpose of assessing need for communications. In their report they list the difficulties in uncovering real needs and matching these to the technology. They came to the conclusion that standard needs assessment procedures do not reveal authentic needs, because needs analysts have traditionally approached the problem by selecting types of users who tend to identify rhetorical rather than actual needs. They show in their case study that operational systems rarely emerge from needs assessments because:

> "There is a basic absurdity in the concept that an endeavor which begins with the consideration of a particular technology is not 'technology oriented'. The exploration always centres on fitting any service that comes to mind to that technology." [65]

The generally agreed-upon definition of needs assessment is provided by Trimby as "a process for identifying and measuring gaps between what is and what ought to be, prioritizing the

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[64] Anita S. West, Design Issues for Demonstrations of Rural Service Delivery Projects Incorporating Telecommunications Technologies (Denver: Denver Research Institute, 1978), p. 10.

[65] Peg Kay and John Kramer, Planning for Rural Telecommunications systems: Phase I: A Methodological Approach to Community Needs Analysis (Washington, DC: Office of Telecommunications Policy, 1977), pp. iv-5.

gaps, and determining which of the gaps to work on to obtain closure." [66] English sees politics as part and parcel of the needs assessment process because its consequences portend "possible changes in both the integrative and distributive functions" of (in this case) the school system. [67]

In the communications field, several writers have used a variety of methods to help identify needs. [68] Writing about designing communication packages as vehicles to deliver information, Charles Stratton, for example focussed on a systems design approach and suggested that a "well designed communication system offers multiple communication vehicles" where the goals of communication tailor the vehicles for communication to achieve the goals. [69]

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[66] Madeline J. Trimby, "Needs Assessment Models: A Comparison," Educational Technology, 19:12(1979):24-28.

[67] Fenwick W. English, "The Politics of Needs Assessment," Education Technology, 17(1977):18-23.

[68] For example, a decision-analytic computer simulation technique is described by T.S. Chidambaram, "A Forecasting Model for Evaluation of a New Communications Service", Telecommunication Journal 45:(1975):541-546.; A Delphi procedure is reported by H.S. Dordick, H.G. Bradley, and B. Nanus, The Emerging Network Marketplace (Norwood, NJ: Ablex Publ., 1981), and a variation of the brainstorming procedure is used by Gary D. Gilmore, "Needs Assessment Processes for Community Health Education," International Journal of Health Education 20:3(1977), pp. 164-173.

[69] Charles R. Stratton, "Needs Assessment for Communication System Design," Journal of Technical Writing and Communication 6:2(1979):24-28.

As with evaluation, the innovative nature of elaborate telecommunications systems in health care places a special burden on both the respondents and researchers conducting a survey of needs. In attempting to uncover the communication needs in a community, Kay and Kramer (1977), for example, came to the conclusion that most needs assessment techniques do not reveal authentic needs because respondents cannot envision themselves as users. Warheit et al. writing about needs assessment as part of a requirement for new program proposals in mental health, identified four major barriers preventing the identification of needs by members of a given community, including inertia or resistance, inadequate resources to meet an overwhelming list of needs, interrelated needs difficult to give a priority to, and perpetual transition giving rise to shifts in perceived needs. [70]

Apart from these difficulties in identifying needs, there are striking similarities between technical and ethical difficulties in program evaluation and needs analysis techniques. Mars and Helge (1978) discuss the links at some length. The same paradigm issues (discussed above in relationship to program evaluation) attend needs assessment procedures, for according to Sallis and Hengeller, various professional groups should be expected to overstate those needs

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[70] George J. Warheit, Roger A. Bell, and John J. Schwab, "Needs Assessment Approaches— Concepts and Methods," Rockville Md., National Institute of Mental Health, 1977. Report #HRP0900225. (Microfiche.)

which might benefit their specialty. As an example of professional influence, Howard points out that some characteristics of the medical system, in particular, one-way communication, and elitism, and power hierarchies tend to prevent the involvement of nonmedical people in the process of studying and assessing needs. [71]

As for program evaluation results, there is considerable comment in the literature which disputes that decision makers actually use the results of needs analyses to implement projects. Varenais states that the assumption that needs analyses results in useful information for decision making needs to be questioned. [72] Shapek also states there is little evidence to suggest that ordering needs permit decision makers to plan programs more effectively. [73]

A conclusion which can be drawn from the material which has been reviewed in this and the previous chapter relative to evaluation of telecommunications technology in the health care sector is that few,if any, methods used so far for evaluation and assessment of the telemedicine technologies are either unsatisfactory or inappropriate. It has also been suggested that

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[71] Donna M. Howard, "Health Education Needs Assessment in an HMO: A Case Study," Health Education Quarterly 9(1982):23-41.

[72] Kristine Varenais, "Needs Assessment: An Exploratory Critique," Office of the Assistant Secretary for Planning and Evaluation, DHEW, Washington, DC, 1977, p. 9.

[73] Raymond A. Shapek, "Problems and Deficiencies in the Needs Assessment Process," Public Administration Review 35(1975):754-758.

the introduction of communications technology in the complex context of health care delivery must be considered in association with its intended use and not as an end in itself. A consideration of the use of a communications link must in turn reflect the users' perspective and their communication and information needs.

Technology introduced in the private sector is usually assessed by the simple index of market figures. In the public sector, accountability has been required which, as we have discussed in Chapter Two, has become one of the rationales for conducting evaluations.

If one of the tools either for determining needs or for evaluating technology were to be of sufficient weight, credibility and value, then the need for the other might be eliminated. For example, if evaluation results were to be a guide for decision makers introducing further experimentation, then there would be no need for needs determination, field trials and the like. However, decision making models must forego an examination of the entire scale of problems involved; to consider all aspects would be to effectively paralyze decision making. Decision making models are usually reductionist because it is nearly impossible for the decision maker to examine and act upon all facets of the data. Moreover, Guba and Lincoln have shown that even the Stufflebeam model (as discussed briefly in Chapter Three) which is designed to help in decision making, is

flawed because it assumes that decision making is rational. [74] Research shows there is no straight line from results to action [75] and that there are problems associated with the use of evaluation results due to timing and communications. [76]

In the foregoing discussion, we have discussed needs analyses procedures for telecommunications technology, assuming that the problem of needs identification is closely linked to the evaluation of these technologies. This idea, it must be stressed, is not new. A review of the literature pertinent to needs assessment and analyses in education and technology reveals that many authors and researchers link the two concepts (Trimby). Mars and Helge, for example, [77] link needs assessment procedures to goal setting, planning and evaluation, as do Kaufman, Lee and Harless. [78]

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[74] The Stufflebeam model was described briefly in Chapter Three. In an article written and published in 1973 ("Educational Evaluation and Decision Making") in Worthern and Sanders ed. Educational Evaluation: Theory and Practice, Stufflebeam described a framework or scheme for evaluation which proceeds from context to product and encompasses decision making as a necessary part of the process.

[75] Lawrence Lynn,ed. Knowledge and Policy: the Uncertain Connection . (Washington: National Academy of Sciences, 1978).

[76] Carol Weiss and M. Bucuvales, Social Science Research andDecision-Making . (New York: Columbia University Press, 1980).

[77] W. Lawrence Mars and Doris I. Helge, "The Role of Needs Assessment in Program Planning and Evaluation," Journal of Special Education 12(1978):143-151.

[78] As reported by Madeline Trimby in "Needs Assessment Models" 1979, p. 7.

From a consideration of the inadequacy of evaluation, we have introduced the perhaps oversimplified view that evaluation research and needs determination, assessment, and planning research are merely two aspects of the same coin: the currency in this case, being the communications technology. This discussion introduces the need for a revised, more integral approach which is ideally suited to an examination of both needs and effects of introducing communications technology in the health care field. In a subsequent chapter, such a comprehensive and global approach to examine the introduction of communications technology in the health-care field is described and tested. The conceptual rationale for this approach is given in Chapter Six, and is based on a framework provided by grounded theorists Glaser and Strauss. At least one of the authors reviewed as part of this survey of literature related to needs assessment based his approach to needs assessment on grounded theory. (Mazmanian, 1980). This approach is discussed more fully in Chapters Five and Six.

A Study of Health Care Telecommunications Needs

In 1982, as the DOC faced the winding down of government-sponsored social experimentation and pilot projects on those satellite channels which had been temporarily leased from Telesat for this purpose, various initiatives were launched in an effort to continue some ongoing experimental activity on

satellites. As the lease period drew near, none of the health sector telecommunication experiments or pilots of the recent past had led to long term health or medical service operations, so DOC officials began an informal inquiry into the needs of health care users for telecommunications services.

This inquiry probably evolved, at least in part, because of the failure of the several evaluation reports to show conclusively that satellites were of definite benefit for health care users. As DOC representatives toured the country describing ways in which the newest generation of satellites could be made available to benefit Canadian public and private interests, the inquiry was launched. [79]

Spurred on by several movements towards increased interprovincial and interinstitutional communications initiated in the Canadian health care sector, [80] the DOC, issued a request for proposals for what was termed a "Requirement Survey on the

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[79] O. Roscoe, "Direct Broadcasting Satellite Service in Canada", speech delivered in Vancouver, November 1982.

[80] Evidence of such initiatives is found in the joint publication of A Telemedecine-Telehealth Bibliography by the Canadian Medical Association and Memorial University of Newfoundland; the funding and preparation of a proposal for the use of communications technology by the Canadian Hospital Association (to be reviewed as a case study in Chapter Five); the commissioning by the Canadian Medical Association of a document on the State of the Art of Telemedicine in Canada (Picot, 1981); and the creation of a telemedicine office in the province of Ontario's Ministry of Health, Office for Emergency Services.

Uses of Telecommunications by the Health Care Professionals". [81]

In their statement of work, the DOC gave the following broad objective for the study: "to determine how available telecommunications capabilities can be used by health care professions to assist in the delivery of health care." The following information was included in the background statement:

> "The Department of Communications has encouraged development of innovative telecommunications applications for the delivery of health care through several system demonstration trials. As a result of these trials, telecommunications is being used successfully by some medical institutions in such cases as specialist consultations, nursing station support, staff development, patient education, hospital administration and other related applications. The effectiveness of these telehealth systems are well known in the industry and the telehealth developments in Canada have received international acclaim.
> "The Department of Communications now wishes to explore methods of extending the benefits of modern telecommunications for the delivery of health care on a much wider scale to include both prevention and care. This will require an examination of the health care system in Canada to identify communication and information requirements, an evaluation of possible system solutions through appropriate coupling of technologies . . . and the determination of cost effectiveness of system solutions on an individual basis and through aggregation of the requirements of the over 1500 health care institutions in Canada." [82]

At an estimated cost of sixty thousand dollars, the survey was to accomplish the following tasks:

1. Present a detailed account of the Canadian health care system;

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[81] Louis A. Cloutier, science procurement manager, Supply and Services Canada, letter to interested consulting groups and companies, 17 February 1983.

[82] Ibid.

2. Conduct a comprehensive literature search on the subject of telehealth and list existing uses of Telecommunications in health care;
3. Conduct a survey of the communications requirements of medical and health institutions, associations and personnel;
4. Identify system concepts that can meet some of the requirements;
5. Identify any institutional regulatory and legal issues that may impede implementation of these systems;
6. Make recommendations where further investigation is necessary.

A number of consulting firms submitted proposals and the Woods Gordon consulting firm was chosen to conduct the study. Although destined for completion in August 1983, the report was not released until February 1984.

The Woods Gordon team which included a physician, a management person, a lawyer and an engineer used a descriptive approach to accomplish each one of the six tasks. To describe the Canadian health care system, for example, their approach was to:

> "take advantage of the excellent documentation of the health care system that is already available from a wide variety of sources available to us, and then to organize this general information into a focussed description of the system from a communications requirements perspective." [83]

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[83] Woods Gordon, Uses of Telecommunications within the Health Care System, Report to the Department of Communications (Ottawa: DOC, 1983).

This part of the report, then, contained nothing markedly different from existing documentation already available from government publications and other sources, except that the perspective taken is that of marketing, dividing the sector into six possible groupings labelled consumers, institutions, governments, professionals, associations and the private sector. In an attempt to flesh out what the telecommunications needs are in this vast and diverse sector, the health care system's activities were subdivided into four general areas: education, health care delivery, administration and social. In each of these, the report begins by reminding the reader that Health and Welfare Canada contributions through cash payments and tax transfer will be 9.4 billion dollars in 1983/84, so that " the health care industry in Canada is substantial and would provide an important market for telecommunication services". [84] For each of the areas, the report attempts to label the possible opportunities for telecommunications applications. For example, in their description of health are legislation as

> "regulated by a patchwork of federal and provincial legislation which provides for federal cost sharing subject of certain minimum standards"

the report's authors underscore that the " commitment to reasonable access provides an impetus to use telecommunications to provide health services to northern and remote

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[84] Underlined words are those of the authors in their report, Woods Gordon, p. 15.

communities" [85]

The authors also note, as so many others have, that there are marked variations in the utilization of health care resources between different regions and that this disparity is likely to continue: "Telehealth programs therefore provide an important alternate means of satisfying some of the current and future health care needs of people in rural Canada." They emphasize that all initiatives will need regional cooperation. Trying to locate who/what would be the most influential members of the health care community, they identify as most influential, two different entities, one quite different from the other:

> "the health care system is dominated by the institutional care component. . . which utilizes the lion's share (approximately fifty-three per cent) of health care expenditures. Hospitals tend to be the single largest and most influential health care provider in any community."

and, on the same page, they state:

> "the most influential health care providers are the physicians who are the 'gatekeepers' to the system and the nurses who are the major care givers. There are approximately 42,000 physicians and 200,000 nurses in Canada." [86]

Their conclusion to this section indicates that professional education has been and is likely to continue to be the most fruitful area for the use of telecommunications in health care.

To fulfill the second task, that is, to describe the existing uses of telecommunications uses in health care, the

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[85] Ibid.

[86] Ibid, p. 16.

Woods Gordon report presents a bibliography based on the findings and research of other authors and previous research. This is accompanied by an overview of historical telehealth activity in Canada and the US, from which it is concluded that the previous projects on satellites had been brief and complicated by technical and organizational difficulties.

> "They demonstrated that satellites can be used to provide telehealth services; however, the costs are high and these services can only be cost justified if they support a large user community. In the Canadian context, this means the shared use of these systems with other education and social services applications." [87]

The authors then overview current telehealth acitivty which they label as the third stage of telehealth activity, listing teleconferencing, a number of broadband links and Telidon projects for telehealth information.

Proceeding with an overview of trends, the report identifies the following:

1. "slow transition from government funded clinical trials to products developed by the private sector for a mass market-
2. rush by hospitals, government agencies and private companies to get an early foothold in what is seen as an important and lucrative market -
3. large and slowly growing cadre of people in Canada who are knowledgeable about the capabitilities of telehealth taking an active role in duffusing telehealth information. . . .
4. future telehealth applications will involve combinations of technologies
5. telehealth continues to be caught in a perpetual chicken and egg dilemma: many applications are not cost-effective unless they are provided to a mass audience; however, there is no mass audience for many telehealth applications because they are not cost effective."

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[87] Ibid, p. 21.

The authors terminate this list of trends optimistically:

> "whereas previous telehealth applications were technology driven with solutions looking for problems, current approaches focus on user needs and finding the optimal mix of technologies to meet those needs." [88]

In attempting to fulfill the third task, the report reiterates what has often been said in the needs assessment literature, that is, needs are difficult to define, "particularly in the area of market definition and quantification." Here, some agreed-upon definition of need seems to underlie the Woods Gordon description and to be intimately associated with cost or funding. Indeed, funding is the issue most frequently mentioned. Needs are never defined for the reader, as opposed to say, wishes, desires, market opportunities or ideal goals, yet the report states confidently that

> "Our interviews and literature survey demonstrated that the health care community believe that there are real needs for telehealth principally in the areas of education, health care delivery, and administration and that each of these applications is uniquely different." [89]

Under each one of five headings (professional education, health care delivery, administration, public education and other), a diffuse list of such needs is identified, ranging from continuing professional education and remote consultation to travel substitution (for meetings) and consumer health education. Assigning an arbitrary point value to the identified needs (the point system is not explained) the authors go on to

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[88] Ibid, pp. 27-28.

[89] Ibid, p. 30.

give their findings:

> "Based on our literature review, personal interviews, and telephone survey of user needs, we have reached a number of conclusions which are important for the future formulation of system concepts: ... no one single technology or small group of technologies will meet all needs. . .
> "There is intense activity in the field of telehealth... users are successfully uniting technologies...
> "Users were generally catiously optimistic.... Most experienced suppliers were pessimistic about the cost effectiveness of telehealth systems....
> "Several people interviewed suggest that telehealth is a technological solution looking for problems to solve. . . .in telehealth most of the costs are additional, and most of the benefits are intangible....
> "several efforts to establish the cost effectiveness of telehealth . . . were unable to demonstrate substantial cost savings...
> "A national picture... indicates a general lack of coordination between users...
> "There is a need to provide a forum for ongoing dialogue between the various participants in the telehealth industry.
> "It is clear that telehealth has been technology driven and every new technological breakthrough... opens up new alternatives for the delivery of telehealth services.
> "Telehealth is a constant dynamic.... The constantly shifting nature of telehealth is... justification for maintenance of a central clearing house of current information on providers, users, and technological innovations." [90]

As the above list shows, there appears to be no overwhelming need for telehealth applications. The reports conclusions do not identify user driven contextually focussed applications for telecommunications in health care. There are a number of reasons for this, and some of these are discussed below.

The Woods Gordon report was formulated to provide for the client (the DOC) a positive picture of identified needs for

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[90] Ibid, pp. 33-38.

telecommunications technologies. The need for telecommunications is defined in this report as a market, and thus, since a substantial amount of health care activity is already provided to recipients without direct charge, a large proportion of information and communication activity is removed from this market equation. It has not yet occurred to the DOC or to the information gatherer and provider in the private sector that a great deal of health information is currently available in the Canadian health care system at no cost.

Such health information– although valuable– is difficult to calculate in terms of a dollar value. Its value may be estimated through tradeoffs, but often the traded commodities or dollars come from different pockets. Whether this is in the private or public sector where health services and medical care are subsidized, few incentives exist which prompt users to buy information. In this situation, telecommunications can perhaps be useful in providing better access. Sending such information on faster channels, aggregating it or providing better delivery will not alter the fact that the information is already available. Only one factor would change some current health care information into a commodity, and that is, removing it from circulation in its present form. Not only is this impossible to do, it is highly undesirable.

A second alternative would be to create new access routes to information which might tend to produce an exclusively informed elite in the health care system, providing an impetus

for some to join the information network.

But neither of these two situations takes into account the actual, real world context of health care which is one in which information has to be exchanged and available to the users in the least constraining way possible, and under the most familiar and easy to access conditions available. To ignore this is to create artificial markets. Hence the entire study, tending towards such goals as aggregations of users, collaboration and ideal mixes of technologies misses the point.

A second overarching problem with the study rests with the methodology, admittedly limited to the available survey techniques. A first problem with the method is that the reader is not told who expresses what need. Hence, what vested interests are at the base of these lists of needs is never explored.

The central method of the report was the guided interview. Approximately ninety people, considered experts of potential or actual users, were interviewd, in some cases, several times. No theoretical perspective or conceptual basis was made explicit for the methodology used. Indeed the picture which emerges is a markedly superficial one which may satisfy the client, but which fails to analyze why improved telecommunications systems might be required in the health care sector, by ignoring the user context and dealing solely with descriptions of the health care system, the technological possibilities, the past experiences, and finally, placing some emphasis on market forces and barriers

to adoption of these systems.

To fulfill the fourth task, the authors of the report attempted to locate systems which would be cost effective, but were unable to do so. They could find only very few systems which had proven to be economically viable. Finally, they could not find any telehealth services "with a clear and substantial payback to the consumers or end users." [91] Emphasizing once again, commercial success, they identified national data networks involving hospitals, physicians, nurses and other groups of health professionals, and secondly, audio teleconferencing networks for continuing professional education, administrative functions, and remote consultations as being the most likely to succeed commercially. These findings were based on their interviews of actual users and promoters of these systems, as they explain in their methodology.

In the foregoing discussion, it has been assumed that communications technologies enhance the availability of information, that is, such systems would have as their primary objective better access to information in whatever form. It is surprising that throughout the report, as in other survey reports of this nature, the telecommunications technology or system is discussed as separate from the information which the technology is meant to carry. It is assumed that the availability of a telecommunications network will find its own content, yet another example of how the context is ignored.

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[91] Ibid, p. 60.

Perhaps the most glaring ommission of contextual focus is found in the report's final section, that which deals with regulatory and other barriers. This section deals almost entirely with technological considerations and with the regulatory environment provided by, for example, the CRTC. Only a passing mention is made of the barriers to adopting telecommunications systems in the health care sector because of such issues as confidentiality, medicolegal liability, and physician reimbursement. No mention is made of the barriers which exist between professional entities which tend to promote vested interests by protecting, not sharing information. No mention is made of the vast array of institutional barriers which exist in the health care delivery system, which are bolstered by regulation, professional guidelines, and specialty barriers. Because telecommunications would transcend these and provincial barriers (health is a provincial matter), a national network, such as is recommended in the report, would have the effect of diluting these barriers, carefully nurtured over the years, and these are important entities to consider.

IV. Summary

This chapter began with a review of the literature pertinent to telemedicine projects other than the case study presented in the previous chapter. Both US and Canadian project literature was reviewed, and this review demonstrates that evaluation procedures developed and implemented in other projects were very often beset by the same difficulties evident in the first case study.

Following this, the second part of the chapter presented an analysis of the issues which emerge from the first case study, which point to the inadequacy of evaluation procedures to show a true picture of the events. Additionally, it is suggested that the user needs were not taken into account when the telemedicine projects were introduced. Finally, a third section of this chapter introduced the idea that needs analysis and evaluation procedures are practically and conceptually linked, giving rise to the notion that a global approach is required for examining many of the issues relevant to the introduction of communications technology in the health care field.

As part of the review of needs assessment literature relevant to telecommunications in health care, a more detailed review and critique was presented, featuring a 1983 survey of health care sector needs for telecommunications services.

E. Chapter Five: Introducing Telecommunications in the Health Sector: Two Contemporary Case Studies

Introduction

Through two contemporary examples, this chapter illustrates the complexities encountered, and the issues which emerge in the planning of a health communications system, whatever the technology, the context or the intended applications.

It has been argued in the previous chapter that the two processes are linked, that is, (1) implementing and (2) evaluating communications technologies are two aspects of technological development which can emerge from the same perspective. Because of the need to gather a multiplicity of data, viewpoints and perspectives, the same case study methodology is used as in Chapter Three. [1]

One of the conclusions drawn through the first study presented in Chapter Three is that no one well developed, tested methodology appears to exist to guide an approach for the evaluation of telemedicine and telehealth systems in health care. Similarly, of the several ways in which the introduction of communications technology can be achieved, including experiments, field trials and demonstrations, few of these methods appear to have guided the development of such systems for the Canadian health care delivery system. The two case histories presented in this chapter will illustrate these

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[1] R. Stake, "The Case Study Method in Social Inquiry," Educational Researcher, 7(1978):5.

problems.

Documentation of these two contemporary studies was made possible because of firsthand involvement by the author in studies preliminary to the implementation of communication links in two different aspects of the health care system. The case studies described below are reconstructed from data obtained through documentary research, observation and interviews.

The purpose for presenting these studies is twofold. First, the studies themselves provide further illustrations of the multiple contexts and the many aspects of the problem of introducing communications technology in the health care sector. The two contexts from which these studies are drawn differ one from the other, as well as from any of the contexts described in the case study presented in Chapter Three. The second purpose is to illustrate the need for a new approach and to partially test it through the study presented in the last half of this chapter.

Overview of Chapter

Following this introduction, the chapter is divided into two distinct parts, one for each of the two contemporary case studies. The setting and context for the study contained in part one is a national health association. A short historical sketch which introduces the study covers a time span stretching back some years prior to the actual period in which the research was conducted. Timing for this study actually covers a three-month

period when most of the data were obtained for the study, via interviews, observation and selected reviews of published and unpublished materials.

The second part of the chapter consists of another contemporary case study, this one involving an educational network. The study itself rests on data gathered over a period of four months, but the background for the presentation of the data is drawn from documents dating back to the mid-seventies. Unlike the study presented in the first part of the chapter, telecommunication links were already in place when interviews were conducted. Interviewees were selected from a broad spectrum of intended users, potential originators and receivers of information. The data for this study draw mainly on interview transcripts and documentary information.

I. Communications Technology in the Context of a Health Association

Introduction

The author became involved in this research as principal investigator in the spring of 1982. At that time, a national health association [2] wished to determine what might be an appropriate technology for a communications network to respond to the association's communication needs. In this context, network is defined braodly as an interconnected set of dependant or independant terminals, points or nodes, carrying data in analogue or digital form, accessing one or more sources of information and using one or more telecommunications channels and modes. Such a network might eventually form the basis for the evolution of a national health network to carry medical and health information judged necessary or desirable for member associations, participating individuals and institutions, and perhaps the general public. If a need for a communications

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[2] The Association in question is the Canadian Hospital Association (CHA), a federation of eleven health and hospital associations (provincial/territorial) which together represent 1200 or so hospitals throughout Canada. Permission has been obtained from CHA Officials to use this information, provided the anonymity of the individual interviewees be preserved and that confidentiality of interview material be maintained.

network emerged from the study, the investigator was to prepare a proposal, identifying the technology required to meet the identified communication needs.

Early in the course of the study, it became evident that association members were unfamiliar with communication technologies and their applications, and the potential implications associated with developing a health communication network. Association members thus seemed ill-equipped to make informed decisions regarding specific communications technology applications. A proposal for a communications study was structured which de-emphasized the need for a specific communications system. It emphasized the need for an educational approach instead, in part to improve existing communications, and also to determine what communication needs existed and which of these could be met through existing channels.

In this case study, the background information and the events leading up to the development of the proposal are presented. The methodology chosen for the study relies on a combination of procedures for gathering data.

Methodology

Three different techniques were used for gathering data. First, some time was spent in observation, mainly at the association's head office. Informal visits were also made to some provincial member association offices. Second, a review of

documentation was conducted to include correspondence, published and unpublished reports, association publications, newsletters and bulletins and minutes of meetings. This review helped to provide a general basis for the direction of subsequent phases of the study. Informed by observation, the review of documentation, and informal discussions with association officials, the interview method was chosen as the principal technique for collecting data. It was judged that sensitive issues would emerge more easily in the interview situation, particularly if the interview was sufficiently open-ended to allow reasonably free expression of opinions and ideas.

In preparation for the project, a number of methodological treatises on interviewing were consulted. [3] To provide respondents with the maximum opportunity to elaborate within the parameters of the interview time frame and the topic areas selected, procedures were adapted from Dexter and Patton. Dexter's treatment of the interview is designed to bring out "the interviewee's definition of the situation." Secondly, it encourages the interviewee to "structure the account of the situation," and "introduce to a considerable extent... his notions of what he regards as relevant, instead of relying upon

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[3] For example, Raymond L. Gorden, Interviewing Strategy, Techniques and Tactics (Homewood, IL: Dorsey Press, 1969); Herbert H. Hyman, Interviewing in Social Research (Chicago, IL: University of Chicago Press, 1975); Sellitz et al. Research Methods in Social Relations (New York: Holt, Rinehart and Winston, 1967); Michael Quinn Patton, Qualitative Evaluation Methods (Beverly Hills: Sage Publications, 1980).

the investigator's notions of relevance." [4]

Interviewees were selected primarily on the basis of their position as actual or potential stakeholders [5] or members of an interest group.

Three groups were interviewed from outside the organization:

1. All but one of the chief executive officers from the provincial member associations (one was unavailable for interview);
2. Twelve of the twenty members of the board of directors of the association (all members who both responded to a request for an interview, and who were present at the annual general meeting of the association, held in June 1982); and
3. A small group of opinion leaders and experts, identified by association administrators as acknowledged opinion leaders.

Within the association head offices, twelve staff members were interviewed, including the chief executive officer (CEO), and all three vice presidents.

There were forty interviews conducted in total. Some interviewees were approached again for additional information in the course of several visits made over four months.

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[4] Lewis Anthony Dexter, Elite and Specialized Interviewing, (Evanston, IL: Northwestern University Press, 1970),p. 5.

[5] Stakeholders were defined in an earlier chapter as 'anyone having an interest in the project- whether positive or negative- in this case, as a client or user of technological system.'

All interviews were audiotaped and transcribed by a secretary typist. Interviews lasted from thirty to ninety minutes. Interview transcripts were then studied, analyzed and summarized by two researchers.[6] Considerable time was also spent on the review of the documentation. As well, five of the provincial association offices were visited.

Background and History

The association consists of a national independant federation of eleven member health associations. With its head office in the national capital region, it enjoys ready access to current health information of national relevance because of its proximity and longstanding relationships with several branches in Health and Welfare Canada, with a selection of other health associations and national advisory councils and committees.

The association was formed in 1931, and fulfills a wide spectrum of functions on behalf of member associations. These functions are grouped under umbrellas for research, education, publications and representation. At the time of the study, the association employed some forty-eight persons, full- or part-time, with some staff members on loan from other agencies and from universities. Association activities are guided by a

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[6]The able research assistance of Marguerite Vogel, MA student in Communication, contributed to this study in a number of significant ways, particularly in the coding and summarizing of the interview transcrscripts.

board along with subcommittees representing member associations and particular areas of interest and expertise. Committee board members are drawn from across Canada. The association is supported by revenues from membership fees, grants for a variety of research projects, and from the sale of educational programs, seminars, publications and periodicals.

The association began taking an interest in communications when the head office was moved to Ottawa (from Toronto) in 1977. Links with similar associations were made easier, and the possibility of sharing a national conference and media centre was an early focus for the association's hoped-for role in communications. This development did not materialize, in large part because facilities and diverse mandates could not easily be joined under a common roof or in a common mission.

At the time of the study, the information and communication requirements of the association and its committees were being met largely through the medium of print or via face to face meetings, local and long distance telephone calls, and occasionally, audioteleconferencing. Over the years, the association had taken care of its increasing information and communication requirements through some office automation, occasional use of communication technologies, other than the telephone, and the gradual integration of a variety of information processing procedures.

From 1979 to 1981, the association initiated a series of events which showed a stepped-up level of interest in

telecommunications. In 1979, the purchase of word processing equipment was accompanied by the suggestion, in the CEO newsletter, that a telecommunications package might be made available to members who wanted it. In the same issue, concern was expressed over problems with the postal system as inadequate distribution of time-bound information. A Communications Proposal prepared by the executive vice president in August 1981, outlined in very general terms what might be the role of the association in dealing with the communications revolution. [7] Concern centred on American involvement in health telecommunications, described as threatening to the Canadian association's educational activities.

In 1981, a CEO Newsletter reported that the association administrators met with the Canadian Cable Association and "discussed the possibility of broadcasting patient information and staff education programs to hospitals across Canada." [8] The same issue also carried reference to a letter written to the CRTC suggesting a special television channel might be dedicated for health professionals. In the fall of 1981, informal discussions were held with the DOC "in order to pursue the use of new communications technology." Moreover, the executive vice president was to "explore what initiatives " should be taken by

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[7] Canadian Hospital Association, "Communications Proposal," 20 August 1981.

[8] Canadian Hospital Association, CEO Newsletter 3(July/August 1981):1-4.

the association. [9] One outcome of these informal contacts was that a Telidon demonstration was arranged for the association board of directors. [10] This demonstration appeared to create mixed impressions– both favorable and unfavorable.

At this time, a communications analyst was hired and prepared a comprehensive report on all forms of communications technology in the health care sector. [11] The association's official publication carried several articles on telecommunications in health care in a special issue devoted to the subject. [12]

Some of the correspondence and published information make it clear what factors led up to this flurry of telecommunications interest and activity. It was reported that the American counterpart association had had several satellite conferences over the years 1977 to 1979. [13] had had several satellite conferences over the years 1977 to 1979. As a result

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[9] Ibid.

[10] Telidon is the Canadian version of videotex. One of the fundamental differences between Telidon and other videotex systems is the alphageometric method used to generate graphics, as opposed to the alphamosaic method used in other systems.

[11] Wanda MacDonald, Telecommunications in the Health Care Industry: An Overview. (Ottawa: Canadian Hospital Association, n.d.).

[12] See Canadian Hospital Association's Dimensions in Health Care 59(March 1982)3,10-26.

[13] American Hospital Association, "Atlanta '77: The American Hospital Association's First Satellite Demonstration," 1977; ___, "Anahein '78: The American Hospital Association's Second Annual Satellite Broadcast," 1978; ___, "Focus on Health Care 79: AHA's Third Satellite Broadcast," 1979.

the US association was proposing a satellite educational television service and network for health professionals and their institutions. When this proposal came to the attention of Canadian association officials, fears were expressed that there would be loss of an important segment of the Canadian association's educational market. Another concern was that "Canadian hospitals could be attracted towards American issues and American programs which may not necessarily meet Canadian needs." Finally, the concern was expresssed that the American initiative would provide their association with an "innovative technological advantage" which might have "unforeseen implications." [14]

These concerns, coupled with the association's interest in a conference centre and the DOC's Telidon presentation to the Board of directors, created a climate of renewed telecommunication interest. At this stage, it was still unclear what technology the communications network was to employ and what kind of information it was to carry.

In 1982, the general emphasis in the documentation produced by the association in connection with communications shifted away from a concern with US events to a greater emphasis on the new technologies associated with communications. In particular, a revised proposal described three important steps taken by the

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[14] CHA, "Communications Proposal," p. 20.

association within the relatively short period of five months:[15]

1. The successful application under the DOC's Industrial Investment Stimulation Program (IISP) for Telidon equipment; [16]
2. A proposal for a teleconferencing service;
3. The initiation of procedures for an application to the CRTC for a television channel license.

A two-day communications workshop was held in February 1982. This workshop's objectives were:

- "to provide information on topics concerning communications technologies and developments in this field;
- to present examples of hospital/health associations' involvement in this area;
- to provide an opportunity for associations to share ideas experiences and concerns related to this technology;
- to discuss how efforts should be spent to address the concerns and needs of the health industry." [17]

Twenty- nine persons representing health institutions, agencies, member associations, the DOC and Bell Canada attended. The workshop included equipment demonstrations and introduced Telidon technology.

Office automation and other forms of telecommunications technologies were described and demonstrated. Communications

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[15] Paul Brown, Proposal for a Communications Service (Ottawa:Canadian Hospital Association, 1982).

[16] This program allowed for investors in the private sector to purchase Telidon equipment on a two-for-one offer, with the balance being paid to the supplier by the federal government.

[17] Canadian Hospital Association, "Communications Workshop Agenda," Ottawa, 22 February 1982.

technology and information resources already available in various provinces were discussed. A summary of the workshop included the following comments:

> "Certainly it is difficult to summarize the effects that this two-day workshop had on the participants and the group as a whole. One major point that was prevalent is that the technology is available. . . . The issue to be concerned with is what are the needs of the health organizations, and can the technology be effectively used to meet these needs...." [18]

The results of this workshop, along with two other events which occurred at this time, seemed to provide yet a new orientation to the association's telecommunications interests. There was a new emphasis placed on needs and a shift away from an exclusive hardware orientation. This resulted in the realization that member support for a communications project was essential to its success.

The first event concerned a proposed Telidon network. Although the IISP application was successful and ten Telidon terminals with page creation facilities were ordered, the project was never implemented as originally envisaged. Member associations did not immediately warm to the idea of receiving the Telidon hardware, and the offer was turned down by a majority of provincial associations. Subsequently, a reduced number of terminals was ordered for only those federated associations who expressed interest in Telidon.

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[18] ___, "Report of the Communications Workshop," Ottawa, August 1982.

Another significant event which influenced the course of action undertaken by the association was the resignation of the communications analyst. This resulted in some of the projects being placed on hold and others abandoned.

It was in the wake of these events that the author was asked to study the situation and chart a direction for future communications development for the association. It was anticipated the outcome would be the preparation of a grant proposal to fund any proposed course of action.

The author met with association officials in May 1982. Following some initial discussions, brief, informal interviews were to be held with head office staff and association representatives to discuss the potential for improved communications, and the need, if any, for communications technology outside association walls. Procedures were developed for the study which included:

1. study the overall goals of the organization,
2. review pertinent documentation,
3. assess communication needs of the association through interviews with staff members of the national office, and with selected respondents in provincial member associations,
4. obtain additional information about the flow and quantity of communications through an inspection of relevant data, such as incoming telepone calls and correspondence,
5. visit selected health associations where communications technologies or systems other than telephones had been

implemented.

Procedures for steps one and two revealed much of the information used to sketch the background and history of the last few pages. At an annual general meeting of the association, step number three, the interview stage, was put into operation, because many of the respondents were in attendance. Other interviews were held later in the course of visits made to the offices of the provincial associations. [19]

Interviews were unstructured. At least the following areas were explored:

- Communication needs of all the associations in the federation,
- Information needs, regional and national,
- What communication technologies might improve or enhance communications,
- Problems which might mitigate against the development of increased communication networks for health purposes.

In considering these questions, the association's objectives were studied carefully in relation to roles and functions of individual associations, especially in relationship to the overall picture of the Canadian health care system. As the study's objectives evolved, this mandate proved to be too

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[19] Since the CHA is a federation of provincial associations, it represents the interests and needs of its member associations. These, in turn, represent their own members inside their provincial borders. Thus, the interviewees were chosen as representatives of the provincial associations, for any communication plan would require the participation of these regional members as primary nodes in any type of network.

broad. The study then focussed more closely on the association's needs for improved communications in relationship to the needs of the Canadian health care system.

Some Contextual Problems

Three types of contextual problems influenced the content and direction of the interviews. First, health care budget cuts were being announced in most provinces as the interviews were being conducted. Press releases were dramatic. It was difficult for interviewees to focus on health care information and communications when jobs and institutions were at stake, strikes loomed, and services and facilities were threatened.

A second contextual problem occurred because of the wide variation encountered in interviewee knowledge of the technologies for communication and information. A range of responses was recorded, corresponding roughly to the exposure and experience of the interviewees. Even without using technical jargon of any kind in the course of the interviews, finding common ground presented a problem.

The following passages, taken directly from the report presented to the association, describe the terminology problem:

> "What surfaced in all the interviews was a problem of terminology. 'Communications' means different things to different people.... If there is one common denominator, it is that it is hard to conceive of communications in the abstract. It is a concept almost always considered in association with the information communicated, the channels for communicating, and the technologies that facilitate communicating information. "It is equally

> difficult to consider the term 'network' out of context. For communication purposes, there are social and electronic networks. In an electronic communications network, individual units or 'nodes' are linked and have the capacity to receive, disseminate and sometimes produce information using any number of channels. The notion of network is also considered in association with the information transferred, accessed or processed. Finally, the concept of 'networks' and 'communications' are, themselves, closely intertwined." [20]

At a more fundamental level, there are difficulties in creating or achieving common meaning when using such ordinary, yet overused terms as 'need' or 'network'. As reported earlier in a discussion of the literature of needs assessment (Chapter Four), the concept of need does not have a universally accepted definition.For purposes of this study, the interviewees' own meaning of the term need was accepted as the definition used within the context of the interview.

By far the most important of the contextual problems can generally be labelled as political in nature. Political realities caused constraints at a minimum of two levels. One level consists of those politics associated with the delivery of health care in Canada, since, in practice, the responsibility for health care is a provincial matter. With the federal government's involvement in health care, [21]

The other level of political reality corresponds to the association's mandate: that of representing member interests.

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[20] Jocelyne Picot, "Proposal for a National Telecommunications Network," prepared for the Canadian Hospital Association, August 1982.

[21] there are eleven health care systems in all. Some of the conflicts and problems associated with the Canadian health care system are described more fully in Chapter One.

Member interests are often local in character, and are sometimes in conflict with national interests, especially in a struggle for control, visibility, funds, power and prestige. It was mentioned more than once by the interviewees that ownership of a communications network could either diffuse or centralize power and control.

Interview summaries

Chief Executive Officers - CEOs

CEOs of member associations represent their own membership's interests to provincial governments, especially ministers of health. They are involved in a range of activities, including negotiations, planning, and projections. Each CEO puts his or her own stamp on the role which is generally a high profile one. For example, CEOs are asked to make press statements on current health issues, and they are often asked to state a position on controversial events and topics. Thoroughly familiar with all aspects of health care delivery at the provincial level, CEOs help keep member institutions informed of trends and futures, through their educational programs and publications. Outside provincial borders, CEOs may represent their members on a variety of national councils, boards and committees, and so they must also be familiar with health care delivery issues at the national level.

Because the national association consists of a federation of ten provincial associations and one territory, the need, if any, of each of the provincial associations for improved communications was given prime consideration as a first step in the formulation of a possible network. This assessment of need would assist, it was reasoned, in the establishment and the design of a prototype or test network with communication links.

This initial hypothetical formulation had to be entirely revised for it did not survive some basic reality tests. None of the CEOs interviewed spontaneously described a consistent need for improved communication, either within their own association, between associations and their provincial membership, or with other health associations, including the national one. Moreover, in their description of the need for access to information, no common pattern of information needs emerged.

Some expressed the need for information in decision making processes involving negotiations with governments, for budget allocations, labor negotiations and the like. Others expressed concern that rapid access to information was needed in member institutions, occasionally even in life threatening situations.

The CEOs were, as a rule, politically astute, aware of the need for accurate information in transactions, persuasive and adept at person-to-person and face-to-face communications. Many CEOs had a personal style of leadership which could be characterized as charismatic. In some politically charged situations, CEOs said they took initiatives and made decisions

in the absence of up-to-the-minute facts, relying on their track records for performance and credibility.[22]

When CEOs were asked how communications could be improved generally, at least two answered they did not know. Two others needed "guidance", and the rest of the responses could fit a broad based wish list. A few of the CEOs spoke of the introduction of communications technology as a good idea. Nearly half expressed some basic knowledge of new telecommunications tools, but most had never used them, and were unsure how their routines might be affected with the use of a communication network. Two stated that improved communications would not necessarily help them in their work.

The CEOs, in their interviews, appeared to identify more strongly with their own provincial members than with colleagues across borders or at the national level. Several suggested they had valuable resources (e.g., information, expertise, courses, materials) to share with other provincial associations. None spontaneously suggested that their provincial counterparts had information which they themselves could use, or that the national association could be an effective health information source. Four of the CEOs said they were unfavorable towards the development of a national network.

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[22] During the summer of the interviews, many such situations presented themselves due to the dramatic funding cutbacks mentioned previously.

Board Members

At the time of the interviews, there were twenty members on the board of directors of the national association. Most were appointed by provincial associations. Board members have a dual allegiance which sometimes places them in conflict, for they must guide a course of action, or underwrite policy which may be in the best interests of the association at the national level, but not in the best interests of their own provincial associations, or vice versa.

An example of such a dilemma is that presented by the whole notion of the implementation of a national health communications network. Board members were being asked to choose what is the best course of action for the national association, and they also had to be conscious that the implementation of such a network would lower the chances for their own provincial association to take similar initiatives.

Twelve board members were interviewed. As for the CEOs, they represented a broad spectrum of expertise and knowledge in the technologies for communications. Only three spontaneously expressed a positive, enthusiastic attitude towards the development of a national network by the national association. Five had a neutral attitude and the rest were negative to the possible development of a network.

A majority of board members felt that the onus for improved communications should be placed on the national association,

e.g., it should seek more feedback from its federated members prior to making public statements or decisions which have impact on the member associations. Several board members thought that the development of a network would help them guide the national association in the formulation of policy.

A majority (seven) felt that the association was meeting its stated objectives and more than half thought improved communications would enhance its functions. Both regular board members and executives of the board felt that the number of face-to-face meetings held annually could not be reduced, and could not be held electronically. Only two felt that the annual budget for all meetings [23] should be significantly reduced through other forms of meetings, e.g., teleconferencing. With the exception of only one respondent, all board members interviewed felt a national communications network would help them substantially in the fulfillment of their roles (as board members).

In the course of the interviews, board members spontaneously named some perceived applications for communications. The list included such items as educational course listings and a central information databank for labor contracts in health care. None of the board members could specify what technology might be suitable and none were entirely supportive of the national association as the driving force behind such a network. An overriding concern mentioned by all in

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[23] Estimated at well over $100,000. annually.

some context or another was the question of costs, and who would bear such costs.

Association Staff Member Interviews

The president and vice presidents as well as twelve staff members were interviewed at association headquarters. These interviews focussed on the role which each staff member fulfills. The interviews were unstructured, but questions were tailored to the individual level of practical knowledge of communications technology, as expressed by the individuals interviewed.

A wide difference in perception of communication and information needs was noted in all departments of the association. As with the other interviewees, varying degrees of familiarity with the technologies for communication and information-processing were encountered. Focussing on the roles and functions of each interviewee permitted the interviewer to assess what communications activities and channels were in existence and which needed development. A remarkable difference in perception and orientation was often noted between staff and their administrators who had commissioned the study. These differences led to the formulation of a new and different approach for assessing communication needs. The framework is elaborated more fully in sections which follow.

The interview transcripts revealed the main channels of communication used at the association were the telephone, mail, and face-to-face communications. Association staff, interacting with a large variety of groups, often made informal and formal contacts arising out of common interests. The association's proximity to several national sources of health information: Health and Welfare Canada, Statistics Canada, the Canada Institute for Scientific and Technical Information (CISTI), and others, made it a natural locus for inquiries related to health. Therefore a significant proportion of communication needs were related to requests for information from outside the association. Most of these queries were received and handled by telephone. [24] Since the association did not possess a designated information function or a communications office, individual staff members responded to these queries. Much of the information requested often existed in hard copy form, but retrieval was a problem, as well as storage. [25]

Other than these information needs based outside the association, a number of services offered by the association to its membership and outside groups engendered communication and

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[24] In a two-week period in June 1982, 2077 calls were processed. Twenty-five percent of these were for information from a wide spectrum of callers (nonmembers, researchers, government representatives, and the general public) requesting information of a general nature about health institutions.

[25] A directory containing a wealth of information on Canadian health care institutions is published annually and its files are in a computerized text editing program operated by a service bureau in another city.

information requirements. For example, an association library received approximately ten to fifteen search requests per week from outside the association. Most of the requests were for materials in a fairly unique collection of health administration and health institutional management. Consideration was being given to the installation of a modem to link the association directly with CISTI to handle the many internal requests for searches.

The association's education department had information needs related directly to the provision of correspondence courses and national conferences. [26] Correspondence courses generated student and tutor files. Rapid access appeared to be an asset but not a necessity. Interpersonal contact for students and tutors appeared more important, for staff thought the dropout rate amongst correspondence students was relatively high. Reasons given for dropping out included distance between tutor and student and noninteractivity between students.

National conferences placed a severe strain on the work load of the education department. Rapid information storage and retrieval were seen as important for activities such as reservations, fee payment, registrations, speaker confirmation and appointment. Much of the activity necessitated long distance telephone calls and extensive travel.

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[26] An annual report (1982) described the magnitude of this department's activity. A total registration of 1136 students was recorded in 1981. Over the years, 9783 students had completed association courses.

The education department's adminstration held the view that the market for national educational activities was tenuous– that indeed some of the national programs were in competition with provincial ones and that the most successful educational programs did not need communications technologies to enhance them, for they had traditionally been offered successfully via correspondence. This appeared to be a different view than that held by some of the other administrators in the association.

The publications department reported handling a number of publications with circulations ranging from a few hundred for specialized periodicals to well over thirteen thousand for the official association magazine. Each of eight periodicals had a specific mailing list for circulation and advertising, and each engendered specific communication and information needs.

The research department represented the largest internal consumer of information processing services. It relied on up-to-date information to generate accurate figures in support of its own research activities, and to respond to outside requests. Two projects which relied heavily on current information included the job exchange project and the management information systems project (MIS). Essentially a recruitment service, the job exchange program offered member institutions the names and locations of some seven hundred candidates whose qualifications, background knowledge and skills are coded and placed in a job bank.

The MIS project was conceived to develop a framework for management information systems for use by professionals and health institutions in Canada. It incorporates guidelines for preparing the information required by ministries of health and by institutional management. A work load measurement system is a key component. Project staff reported the project faced a number of challenges, including the need to open lines of communication between institutions, and to improve transprovincial information flow. An important task set for the project was to assemble and make available essential health and hospital information as references for improving the management of health care institutions. Again, a significant difference in perception was noted between some association staff and their administration. Project staff saw no immediate need for communications technologies. Association administrators, however, thought the product(s) developed in the course of the project would lead to the establishment of a health information databank which should be made accessible via data communications.

Outside the association, a selection of opinion leaders and health professionals were surveyed regarding their perception of the communications needs of the Canadian health care system. Several stated there was a need to provide more information generally about the applications for communications technologies in health care. Secondly, several thought education resources needed to be shared. This was seen as crucial, since funding cutbacks prevented health care professionals from travelling to

important conferences. Moreover, inhouse educational services were being severely curtailed in each institution, thereby creating new needs for courses and programs. [27]

Reassessing the Need for Communications Technologies

At the outset, three contextual problems were identified which may have influenced the course of this study. First, there were dramatic funding cutbacks in the health care sector the timing of which coincided with the study. Second, a wide variation in familiarity with communication technologies in interviewees hampered the gathering of comparative data. Third, the political reality inherent in the structure of the Canadian health care system manifested itself in conflicting agendae in some of the interviewees. The struggle for local autonomy in health matters tended to be heightened for some, when they confronted the apparent dilemmas presented by the idea of a communication network designed to meet national health information needs.

It was noted in the interviews that there are significant differences in perception from one interviewee to another of the need for communications technologies. While such differences may be expected from one respondent to another when each represents a different institution, organization, or profession, or a

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[27] This view appeared to be at odds with the opinion put forward by the educational department's administration at the national association, as referenced earlier.

different sphere of activity within the same organization, it was surprising to find such marked differences of opinion within the same department or even between members of the board and association officials.

This observation underscored what was identified initially as a lack of a common understanding of what the technologies for communication networks are, how they can be used in the health care sector, and what their impact might be.

In comparing various combinations of the data assembled for this study, it was also noted that the need for information is not perceived in the same way by different people even if they are in the same organization. In this case, officials and board members held different– at times divergent views– from those expressed by front line information gatherers, users and disseminators of information. Such frontline communicators include secretaries, telephone operators, health care workers, office workers, librarians and the like. Thus new levels of dichotomy in expressing the need for communications technologies were recorded.

Such observations led to the formulation of some tentative conclusions, which, although based on the limited evidence produced by this study, nonetheless underline the need for a revised view of the problem of introducing communications and information technologies in any subsector of the health care delivery system.

Some of these tentative conclusions are:

- A practical problem with terminology and varying levels of familiarity with information technologies lead to difficulties in identifying whether or not any of the technologies will be appropriate to meet perceived communication needs.
- The perceived need for improved communications, or for the technologies which transfer information, varies greatly from subject to subject, even those working in the same department in the same organization.
- In practice, there appear to be at least two levels of interest in the implementation or development of communication networks - a local level and a national one.
- There are several levels of interest in communications technology, represented by groups situated at different functional or administrative levels in the same organizational structure.

Such tentative conclusions with reference to need bear close resemblance to the tentative conclusions drawn at the end of the first case study (Chapter Three) with reference to the evaluation of telecommunications technology in health care. The link between the two processes– assessing need and evaluating communications technologies– has already been discussed. A closer examination of the events surrounding the implementation of communications technologies in health care bears out the need for a revised and different approach to the question of

introducing and evaluating communications technologies in health care. Such an approach must ideally take into consideration the multiple perspectives which invariably emerge. Narrow scope techniques for observing and recording data in both needs assessment and evaluation appear inadequate for producing a comprehensive picture.

A second contemporary case study produces further evidence of the need for such a broad-based methodology to interpret the information which arises out of an examination of need and an assessment of the results of introducing communications technologies in the health care sector. The conduct of the study allowed for the testing of a method for gathering the multiple views which emerge in such a study.

II. Second Contemporary Case Study: A Survey of the Needs of a Health Care Community for the Services of an Educational Network

Introduction

In May 1982, the author was asked by an educational communications network [28] to determine how the medical and health care community in the area served could best use the carrier technologies which comprise the Network to deliver educational and possibly noneducational (e.g., medical) content to health care users. The medical and health care community in this context refers to a broad spectrum of institutions, agencies, and personnel involved in administration, care provision, education, and research in health and medicine.

At the time of the study the Network was comprised of the following carrier technologies: a satellite channel on Anik-B (later, Anik-C) to take broadband video material from various locations and distribute it to a number of sites equipped with a combination of reception technologies including satellite

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[28] The educational network is the Knowledge Network of British Columbia. The Network is a nonprofit multimode carrier of educational programs produced by institutions both inside and outside B.C. At the time of the study, TV programs were telecast to some 100 sites to adult learners in urban, suburban, rural, and remote regions in B.C. using a combination of technologies including a satellite channel. Viewers saw educational programs in colleges, community centres or in their own homes.

receive dishes; a cable linking a number of teaching and health care institutions in the lower mainland; and a microwave link between Vancouver Island (Victoria) and Vancouver.

After a series of meetings with Network officials, an outline of the objectives and procedures for a study of needs was developed. It was agreed that the broad objectives for the study were to encompass the identification of needs first. Such a listing of needs, if any were identified, was to lead to suggestions for appropriate health and medical uses for the Network's communication services. These uses, as identified by the investigator in collaboration with potential health and medical users, were to form the basis for health and medical carrier services similar to that already in place for educational users.

Thus the purposes of the study were :

- To identify the needs of the health care community in relation to utilization of the Network's services.
- To construct, for the Network, a profile of the health users and their needs.
- To suggest appropriate programming and identify the carrier technologies to deliver these, as needed.

The study took place from September 1982 to January 1983, and a report was presented to Network officials in February. The following summary is drawn entirely from data gathered in the

course of the conduct of the study. [29] Appendix A contains most of the report, as it was presented to Network officials. Essentially the report's contents are based on two kinds of information: (1) general background information related to health and medicine in Canada and in B.C. in particular; and (2) comments from the interviewees, mostly members of the health care community in B.C.

Preparation

A prerequisite for the investigator to complete this project included a familiarity with a wide range of similar studies, an appreciation of the number and variety of applications possible in such telecommunication projects, and a knowledge of similar systems. No other system was found however to be comparable in scope to the Network's technology.

Preliminary information about the Network was gathered by studying documents and by interviewing Network officials and staff. This fact gathering was done to provide an accurate picture of the Network for potential health users and to develop an initial list of interviewees. Some time was spent viewing health or medical programs already aired by the Network as part of its existing educational service.

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[29] Permission has been obtained from Network officials to use the information obtained in the course of conducting the study, with the proviso that confidentiality be maintained.

The Network's technology was studied and a short brochure describing the Network and its services was developed for distribution to members of the health and medical community, so that they might have a basic understanding of the technology and of the services already offered by the Network. The brochure was not distributed prior to the interviews, however, as it underwent several revisions prior to publication.

A number of preliminary meetings took place with Network officials. The main objective of these discussions was the definition and clarification of the study's outcomes. After several meetings this clarification proved difficult to achieve. For example, the investigator and Network officials did not always share the same views with respect to the methods to be used for ascertaining the direction for the project. Because a wide range of sources of information was consulted for the study, divergent and conflicting views were likely to emerge, making recording and interpretation difficult. To obtain as balanced a view as possible, therefore, the investigator sought to interview subjects representing a cross-section of affiliations and occupations, and recorded every interview as completely as possible, sometimes with extensive notes, but more often tape recording the entire interview. A full description of the methodology used to both gather and analyze the data is presented in Appendix B , with additional explanations being given later on in this chapter.

A major objective for the study was to identify potential originators and receivers of health programming. The study was to indicate how their needs might be matched to existing Network technology and to emerging technological possibilities. Any initiatives to be undertaken for the health care community were to integrate with other activities and programs currently offered by the Network, wherever possible, and expressed needs which could not be accommodated by current Network structures were to be identified for future feasibility study or applications.

A Capsule History

There are several versions provided in documents and interview transcripts of the history and origins of the Network. Officially created by cabinet order in 1980 "to assist, and collaborate with the universities, colleges, provincial institutes, school districts, ministries and agencies of the province in the development and delivery of educational programs and materials," and "to establish and maintain and operate a telecommunication network" [30] the idea for such a network appeared to have been in existence much earlier. As early as 1974, individual provincial authorities were created to designate and reserve cable facilities for educational

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[30] Constitution of Knowledge Network of the West Communications Authority, Societies Act, SBC, 1977, c 80, filed and registered 29 May 1980.

broadcasting. [31]

In 1976, Hermes satellite demonstrations in tele-education provided interested ministry and educational officials with the first germ of an idea: that of providing a satellite-based educational service to remote communities. Through widely publicized experiments in various parts of the country, the potential for satellite delivery of educational programs became more tangible. Indeed, two interviewees indicated that an interactive program delivered on the satellite Hermes provided the impetus for the formation of a committee which would examine the potential for a kind of open university.

A Program Planning Committee was formed. It consisted of nineteen members who represented various educational and health institutions in the province. Initially, members of the committee visited a number of sites in the US which utilize television networks for teaching and for medical purposes. An interim report was prepared by this group in November 1978. A final report was produced in March 1979, and contained the following background in its introduction:

> "In their role of continually monitoring educational developments, representatives of the Ministry have been reviewing the effectiveness of a number of closed circuit educational television systems such as the one centred at the University of Texas.... As a result of its studies, the Ministry commissioned a report... to advise on the feasibility and cost of providing a video educational network serving the universities, provincial institutes and hospitals of the Lower Mainland and

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[31] The CRTC announced that cable transmission facilities could be set aside for educational purposes by provincial authorities in 1970.

Southern Vancouver Island." [32]

The committee made sweeping recommendations for the installation of various carrier systems, and for the development of programs. The report concluded that a microwave interactive television system be installed to link teaching hospitals and universites, and other post-secondary institutions and to link law courts, industrial sites, and government agencies. The report described the possibilities for future delivery of programs via satellite, and even for data communications networks.

Following the Hermes experiments, certain field trials were initiated to test the feasibility of satellite delivery of educational programs and medical information. [33] In October 1979, then, an Anik-B interactive instructional television project was initiated in B.C. Programs were broadcast from a studio at the British Columbia Institute of Technology to eleven receiving sites. This pilot project laid the foundation for the future services to be offered by the Network. When a cabinet order creating the Network was passed, the technical headquarters for the Network were shifted to the campus of the University of British Columbia. The Network's main offices were installed on the campus of the University of Victoria in Victoria.

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[32] "Link of Institutions for Video Education" Report of the Committee to Advise on the Implementation of an Interactive Television Network Linking Universities, Colleges, Provincial Institutes and other Institutions in Southwest British Columbia. Report to the Ministry of Education, 31 March 1979, often referred to as the LIVE report.

[33] As discussed in Chapter Three.

Meanwhile, a feasibility study conducted by an engineering firm showed that a cable network could be installed to link health and post-secondary institutions. The cable was to be shared with a commercial cable company. [34]

By 1982, cable was being installed, and a much wider satellite network was in operation. A BCIT/Knowledge Network Committee report described the network:

> "There are three major delivery sub-systems that will be inter-related to form the Knowledge Network: Within the Lower Mainland there will be a hard-wired cable system capable of handling at least 28 channels over which the various institutional users can send almost any form of telecommunications data, including voice, video, and computer.... The Knowledge Network will have use of 60 per cent of this channel capacity. Connection to downtown Victoria ... will be made via a two channel microwave link from a tower at SFU. "The rest of BC and Yukon is being served by a one-way single channel satellite link from a ground station at UBC. The signal is received by more than 60 communities ... and is re-broadcast from low power transmitters or is distributed by commercial cable companies." [35]

The Network's 1982 annual report stated that from forty-none receive sites in 1981, the figure had more than doubled. A Canadian Facts survey showed that one hundred thousand adults were viewers of the Network's programs. [36]

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[34] See Gary Brothers, Transportation Trunks and the Knowledge Network, paper prepared by Cablesystems Engineering Ltd., Vancouver and presented at the CCTA Annual Convention, Toronto, 1982.

[35] British Columbia Institute of Technology, "Overview of the Knowledge Network of the West Communications Authority," February 1982.

[36] "Knowledge Network Second Annual Report," June 1982.

In the fall of 1982, when the present study was launched, satellite programming was very much more advanced than cable utilization. Closed circuit coaxial cable had been laid by an engineering company providing the Network with the possibility for "large traffic volume of video and data signals." [37] However, the cable had reached the door of each institution but gone no further. As far as medical institutions were concerned, few of them were actually wired internally for adequate distribution of Network signals. This was destined to change, however, since, at the time of the study, there was a great deal of new hospital construction in the areas served by cable. Many hospitals were undergoing large scale renovations or were being expanded.

A great deal of committee activity by a wide variety of interest groups preceded this study. As well, a number of feasibility studies and reports had been launched to determine how, where, and when the cable network should be used. As early as 1976, for example, the three B.C. universities undertook a feasibility study to determine whether shared computing facilities were possible and desirable. [38] The medical community itself had formed committees and initiated a variety of projects to investigate and explore the use and development of a network. Teaching hospitals had their own advisory committees for use of

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[37] Brothers, Transportation Trunks, p. 9.

[38] As reported in a discussion paper "Data Uses of the Inter-institutional Service of the Knowledge Network," August 1982.

the cable network. An all-hospital committee had also been formed, and its role was to set priorities, examine needs and integrate requests for cable space.

Many of these initiatives were supported by the faculty of medicine at UBC, under the technical guidance of the UBC biomedical communications department. As the study began, these various committees continued to meet, and the reports, projects, and studies continued at the usual pace. This study was able to provide only a glimpse of the magnitude of the activity and interest in the Network's potential. It did not and could not provide a comprehensive list of all of these activities and their outcomes. The awareness that these activities were taking place often emerged spontaneously, in interviews, providing a clue to the enormous interest which had been generated, over a short period of time, in potential and actual telecommunication activity.

Problems and Limitations of the Study

The study was conducted in a timeframe which coincided with two series of events which undoubtedly affected the character of the information received:

1. Decisions regarding cable network installation and utilization were being openly discussed. Emerging issues served to polarize positions around control of the cable network.
2. As with the contemporary case study just described, budget

cutbacks were having serious effects on health care resources, and many interviewees were concerned and aware of the climate of restraint. This most certainly had some effect on the general tone of the interview results.

There were other problems which affected the course of the study from the beginning. To begin with, there were the difficulties mentioned above in reaching common agreement for the conduct of the study. In order to keep the lines of communication open and to prevent misunderstandings, the investigator arranged a series of informal meetings with Network officials as the study progressed. There was also a meeting held at the mid-point of the study to deliver a progress report. This meeting was generally productive and agreement was obtained for the continuation of activities already undertaken. During discussions and in the course of the study, Network officials did not interfere or provide barriers for progress in conducting the study. Every assistance, including requests for documentation, names of contact persons, space and equipment to assess program content was provided. Unlimited access to Network staff persons was given.

Nonetheless, there were practical problems associated with the study. A wide range of personalities were involved or associated with Network business. A large number of committees, sub-committees, interest groups and working groups had been formed by the Network itself during its short life span. Also, formal and ad hoc groups peripheral to the Network's structures

and influence had also been formed. The number and size of the groups directly and indirectly involved and affected by the Network's potential growth into the medical and health field made it an impossible task for the investigator to interview anyone but the principal players on this vast scene. The span of time alloted to the study did not allow for anything more than such selective interviewing. Attendance at meetings and discussion groups as an observer helped to fill in many of the gaps in information provided by the selectivity of the interviewees. Much of the interviewing and information gathering took place in the context of a number of events, including:

- stepped up cutbacks in hospital spending,
- changes in the medical school curriculum following an accreditation report's recommendations,
- widespread new hospital construction, expansion and renovation, most of it happening to teaching hospitals affiliated to UBC, and
- the proposed expansion of the UBC medical school, necessitating changes in facilities and schedules.

Finally, mention should be made of one other problem relating to agendae held by the interviewees in general. Although a communication system generally involves three groups– originators, programmers and receivers– one additional limitation to this study is that where cable links were already established very few respondents in the receive-only category were identified. Only a few interviewees indicated an interest

in viewing programs provided by other originators. One interviewee remarked: "we are all anxious to be heard— is anyone interested in listening?"

In summary, the study was affected by problems both contextual and emergent. The problems were related to budgets, territorial conflicts, and a lack of common understanding between Network officials and researcher of the study's goals and methods. The problems which surfaced as a result of the conduct of the study itself were related to the range and volume of interested parties, all of whom could not be interviewed. These problems encouraged the investigator to explore different methods for gathering and categorizing emerging data. This methodology was chosen to aid in the discovery of insights and to lead to the development of concepts, even theories, judged to be necessary to the process of interpreting the need for communications technologies in health care. A brief description of the method follows at the end of the chapter. The gathering of information from a wide variety of sources made it necessary to handle and systematically group large amounts of narrative information in order to simplify the process of writing a report of findings.

Approach Proposed for the Study

As discussed in Chapter Four, the literature describes various methods for needs determination. These methods have occasionally formed the basis for the implementation of communications projects in health care. A review of the literature describing health communications projects and their outcomes revealed, however, that classic needs determination techniques did not appear to lead to the implementation of any seemingly long-term appropriate projects in health care.

As well, the experience gained in the study presented in the first half of this chapter revealed that there are a number of problems associated with the gathering of information about the need for communications technologies, when respondents have varying degrees of practical knowledge of the technologies and their potential applications.

Officials and source persons were interviewed to establish the limits for the study, to help focus its direction, and to identify potential stakeholders. Respondents were therefore selected from a long list of potential interviewees. Representatives from each sector were interviewed. The interview approach departed fromthose approaches used in classic needs analyses surveys because it did not suggest to the interviewee which applications or needs should be discussed. As needs and requirements emerged from the context and perspective of the user, identified potential uses could more easily become realistic user-conscious applications.

The process can be summarized as follows:

1. The Network's services, and technological capacity very briefly described for the respondent.
2. Two orders of questions are posed: one related to needs, and the other related to concerns.
3. The interviewer may ask questions for clarification during the interview, and all interviewee questions directly.
4. Occasionally the interviewee is approached again for elaboration or clarification
5. Interviewees are encouraged to discuss the problems and issues, as well as potential benefits, in any order they wish, with as little guidance from the interviewer as possible.
6. In-depth review of the documentation, including historical records, correspondence, minutes of meetings and reports are studied by the investigator and form part of the pool of information from which recommendations are made.

The Findings

Ninety-eight respondents had input into the study. Because some of the respondents were interviewed as a group, in a meeting situation, the resulting data yielded sixty-seven individual interview records. These records were created during the interview itself. A full description of the method is provided in Appendix B . Table One below presents a list of the

interviewees and the particular group, organization or profession they represent.

TABLE ONE: INTERVIEWEES BY CATEGORY

Network staff	7
Physicians	15
Nurses	7
University staff & officials	12
Biomedical communications	8
Institutes & colleges	8
Health professional associations	11
Hospital staff & officials	12
Ministry of Health	3
Consultants and others	5
Group interviews & meetings	10
TOTAL	98

The following paragraphs give a very brief list of the major findings and recommendations of the case study. A more complete listing is found in Appendix A which contains selections from the main body of the final report. [39]

The report began by providing a description of the health care community- both in the larger Canadian context, and in the local one. This was followed by a brief overview for comparison of health telecommunication projects in Canada, which have generally been used for one or more of the following

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[39] Jocelyne Picot, "A Study of the Needs of the Health Care Community for the Knowledge Network's Communication Services," February 1983.

applications: undergraduate and postgraduate medical and health education, administration, and, less often, for diagnostic or patient care applications.

Most of the rest of the report was written from data which were gathered using the interview and documentary procedures described earlier. In grouping and categorizing the information gathered, many interests, issues, concerns, needs, as well as wishes and desires, were revealed and recorded.

In the next section, under methodological notes, the method used for categorizing and grouping the data is described. It was through this method that a large number of topics which emerged in the course of the survey could be identified. These topics, which were eventually labelled as "themes", ranged from concerns respondents expressed about confidentiality to technological questions related to production quality. In all, fifty-five themes emerged in the course of the interviews. The themes are listed in a later section of the thesis.

Seventeen of the themes have been selected for a demonstration of the method used for coding and accessing. Through a process of indexing, it was possible to identify the most commonly occurring themes, issues or concerns and to provide a list of identified uses for the Network. In order to demonstrate the accessibility of the data, specific interviewee comments for one of the themes have been printed from the computer data file which contains the interview records (see Appendix B).

Because one of the themes which emerged (as a concern) related to costs, and how the system might be funded, it was judged appropriate to include some information and recommendations related to fee structures for networks. Six different methods for arriving at a fee structure were briefly described, and recommendations were made with respect to additional human and hardware resources needed to offer expanded services.

A number of possible uses for the Network's system were identified by the interviewees. These were listed in the report under technological categories for satellite programming and cable services, where each of these carriers could deliver audio, video and data signals.

These uses included:

For the general public:

- programs with high quality health promotion education content;
- teleconferencing and videoconferencing for general public interactive programs;
- educational programs for upgrading or for refresher courses originating from post-secondary institutions.

For closed groups:

- continuing medical and allied health professional education (CME, and CHE);
- teleconferencing as a substitute for face-to-face meetings;
- newscasts for professional or special interest groups;

- cablecasting of medical grand rounds from one institution to the others in the cable network;
- provision of lectures for students of the medical school who are scattered in various teaching hospital sites throughout the Lower Mainland;
- special event telecasts, for example, invited speakers;
- patient education programming, made available to hospitalized patients via the interinstitutional cable.

A number of computer-sharing and data communication uses were identified as desirable, using the interinstitutional cable to link mainframes and microcomputers for sharing library resources, software for computer-assisted instruction, for sharing of research, inventory, and patient record information, for teletext display, for electronic messaging, for location of physicians, for scheduling of appointments, and for directing patients.

The issues which emerged in the process of the study were very numerous, attesting to the complexity of the subject of this study. Through further dialogue, research, reading, observation and return visits, some issues which had at first been difficult to define and identify were clarified, sometimes becoming subordinate to other larger more pressing issues. How the identification and clarification of these issues and questions were made possible through a technique of thematic analysis is the subject of the final section of this chapter.

In such a study, problems associated with appreciation of the context, as well as the multiplicity of meanings each encounter with new information brings because of the different perspectives associated with old concepts (like need) in new environments (like those created by technology), challenge the researcher-investigator to invent new ways to gather data, and make the appropriate links for a meaningful analysis. In the words of Schatzman and Strauss, throughout the process,

> "the researcher is constantly attentive to options which are circumstantially presented to him. Thus, the field researcher is depicted as a strategist, for without linear-specific design ... the researcher must develop procedure as he goes." [40]

In lengthy conversations with respondents, both urgent needs and wish lists were produced, along with fears, concerns and issues. Seeking a way to make sense and bring order to the aggregated information became, in the course of this study, just as important as the faithful collecting, listing and recording of information. To create meaningful links necessitated the adoption of a revised approach to this kind of field research. The discovery of emergent theory to permit the analysis of results became the revised approach, which, when applied to the evidence, guided the methodology and the theoretical formulation permitting a synthesis from which a substantive analysis could

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[40] Leonard Schatzman and Anselm L. Strauss, Field Research (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1973), p. vii.

be made. In reviewing the applications and merits of this revised approach, it was theorized that the same method could be used for the collection, documentation, synthesis and analysis of information taken at various stages of field research. Therefore the method could prove to be just as useful for evaluation procedures as for in-process studies or assessments of need.

More important than the techniques devised to analyze multiplicity of data is the theoretical perspective which underlies the methodology. The perspective is that which has been advanced by the grounded theorists whose approach has already been described briefly in a previous chapter. [41] The authors themselves formulated and used this approach when attempting to make sense of certain complex contexts such as those presented by the field of health and medical care and its institutions. In such contexts, the lay person is often at a virtual loss because of the very richness of the sources of evidence which present themselves, and the complex interactions between various parts of the field and its microcosm, the institution.

Similarly, conducting assessment research relevant to the introduction of communications technology in the health care field introduces the researcher to a very broad and multifaceted

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[41] Barney G. Glaser and Anselm L. Strauss, The Discovery of Grounded Theory: Strategies for Qualitative Research (Chicago: Aldine Publishing Co., 1967); and Leonard Schatzman and Anselm L. Strauss, Field Research: Strategies for a Natural Sociology, (Englewood Cliffs, NJ: Prentice-Hall, 1973).

context for which a priori theory formulation can create a tunnel view into this multidimensional topic, with the possible resulting exclusion of a rich variety of information. If the researcher formulates conclusions based on information gathered at any one point in such a context, or from a restricted number of controlled sources, what may result is a too narrow view of the situation.

In order to proceed with the study, Schatzman and Strauss (1973) suggest that:

> "The researcher must get close to the people whom he studies: he understands that their actions are best comprehended when observed on the spot - in the natural ongoing environment where they live and work." [42]

The researcher, moreover, "creates his method as he works" and "field method is more like an umbrella activity beneath which any technique may be used for gaining the desired information." [43]

One of the challenges presented by applying the strategies of grounded theory in any study, however, is the necessity for appropriately aggregating the data which were gathered from many sources, and reporting on it in an intelligible fashion, such that meaningful patterns are revealed and theory can be formulated. Again, in the words of Schatzman and Strauss, "what a researcher requires are recording tactics that will provide him with an ongoing, developmental dialogue" and yet, "the

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[42] Schatzman and Strauss, Field Research, p. 5.

[43] Ibid, p. 14.

ordering of data looms as a special problems." [44] One suggestion put by Schatzman and Strauss forward is that of collecting notes into distinct packages of material appropriately labelled observational, theoretical or methodological notes. These notes, when put together, constitute a systematic record of the qualitative information gathered in the field.

Although the categorizing described above mainly applies to observational notes, the same method can be used on transcipts of interviews, through data gathered in documents, or from the research done by others. The interview transcripts may be reconstructed from notes taken during the interview, or from written transcripts of the audiotaped interviews.

A variation of the above-described method of recording and aggregating copious notes gathered in the field was formulated in the course of the first case study presented in this chapter, for it gradually became evident in the course of the research that recurrent themes could be identified (from the notes and the interview transcripts), and had to be categorized in a systematic way without significantly altering the open-ended nature of the procedures.

The report of the first case study in this chapter was a composite of all the interviews and observations, which revealed recurrent themes, leading to the possibility of formulating theory from the data, as the grounded theorists have been able to do.

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[44] Ibid, pp. 94, 97.

As a first principle, it was necessary to not constrain the information flow by overly directing the information gathering procedures. These procedures (as described above) were structured so as to produce a wide range of data, making possible the formulation of theory appropriate to guide the researcher investigating this and related problems. This process is discussed more fully in the chapter which follows. Keeping this experience in mind, the researcher undertook the second study. Here, a similar problem presented itself, that is, how to gather data in an unconstricted manner, and yet make some cohesive sense of the information, to lead to appropriate interpretation and meaningful analysis.

The task of categorizing long uninterrupted transcripts of narrative in order to make sense of the information loomed as an onerous task, until, as the material was read and reread, certain basic themes emerged. Going back over all the interviews, observation notes and documents it became possible to insert the names of these themes for ready cross-reference. This method is similar to the categorizing described by the grounded theorists, but it should be differentiated from content analysis, usually a contextually independant task.

Identification of Themes

Following is a list of the fifty-five (55) themes which were identified in the course of the interviews conducted. Themes identified with an asterisk (*) have been selected for demonstration of the method used for coding and listing the themes in each of the interview transcripts and notes.This listing appears by line range and is presented in Appendix B.

The themes are drawn from interview transcripts and notes. For purposes of this study, a transcript refers to an actual record of the interview. These records were obtained using a tape recorder during the interview, and transfering the interview directly into a computer text processing file following the meeting. Interview notes, on the other hand, were obtained by reconstructing notes taken during the interview. These notes, initially recorded by hand, in point or abridged form, were subsequently written in paragraph form, and entered into the text processing file as narrative, as soon after the interview as possible, usually on the same day.

The following themes were selected for a demonstration of the method used for coding, listing and locating.

*Advisory Councils and Committees

*Air Time

*Changes in Medical Curriculum

*CAI, Self-Instruction

*Educational Needs

*Existing Concerns, General

*Funding the System

*Future Cable Needs - Educational

*Future Cable Needs - Medical Rounds

*Future Concerns, Costs

*Future Concerns, General

*Future Needs, Administrative

*Future Needs, General Comments

*Future Needs, Scrambled service

*Possible Topics for Programs

*Production Quality

*Travel Substitution

The following themes although not shown on the above list as demonstration, were also identified as predominant themes emerging in the interview transcripts and notes.

Aid to Remote Areas

Application Procedures

Biomedical Communications

Concern re: Inadequate Input

Electronic Needs

Evaluation

Existing Concerns re: Confidentiality

Existing Concerns re: Costs

Existing Concerns re: Interaction

Existing Concerns re: Program Design

Future Cable Needs - Administrative

Future Cable Needs - Data

Future Cable Needs - Clinical Service

Future Concerns: Confidentiality

Future Concern: Need for System

Future Concern: Caseload

Future Needs, Cable Only

Future Needs, Other

Future Needs, Scheduling

Future Satellite Uses

Future Satellite Uses, Administrative

Future Satellite Uses, Educational

Health/Medical Paradigm

Medical Diagnoses

Need for Data Communications

Needs Beyond B.C. Borders

Nursing

Ownership and Control

Patient Education

Policy Formulation

Public Education

Publicity

Residency/Internship Programs

Special Events

Technical Concerns

Technological Mix

Teleconferencing

Using this list of themes, any of the study's stakeholders may inspect the notes which have been labeled as such by entering the name of the theme, searching the file and locating each of the instances where the theme had been inserted. Thus, unlike the coding procedures usually used for aggregating narrative, the reader may view the information directly, within the context of its presentation, making the information more meaningful. As well, the computer classification method can provide the reader with the source of the data, so that the expert, the responded or the user can be identified as such.

By contrast to the nominal data presented by content analysis procedures,this thematic identification is made possible through the researcher's assessing the observation notes and interview transcripts in their real-life context. This kind of ready access allows the researcher to conduct in-process assessments, give interim reports, alter procedures to accomodate change or plan for further steps in the study. The themes, as identified, may be further subdivided to identify, for example, the general tone of the remark made, or to categorize the respondent's comments according to a group of interviewees, for example, experts, non-experts, opinion-leaders, and so on.

The following table summarizes a representative list of the themes under headings or <u>themes</u> . Further, the themes may appear

in a context which is neutral, positive, or negative.

In the case of the current case study, then, fifty-five themes were identified in this fashion. Each one of the themes was referenced by the interviewees, in the observation notes or in the documentation in a fashion judged by the researcher to be favorable, unfavorable or neutral. The following table summarizes a representative list of the rhemes, under headings for favorable (F), unfavorable (U), and neutral (N).

TABLE TWO: THEMES

	Number of Comments			
	F	U	N	T
Advisory Councils and Committees	2	0	10	12
Air Time	0	0	3	3
Changes in Medical Curriculum	0	4	3	7
CAI, Self-instruction	5	1	0	6
Educational Needs	10	2	5	17
Existing Concerns, General	0	19	2	21
Funding the System	4	3	7	14
Future Cable Needs - Educational	3	6	2	11
Future Cable Needs: Med. Rounds	9	1	0	10
Future Concerns, Costs	0	3	2	5
Future Concerns, General	0	7	1	8
Future Needs, Administrative	3	0	0	3
Future Needs, General Comments	3	1	4	8
Future Needs, Scrambled Service	4	0	0	4
Possible Topics for Programs	8	0	9	17
Production Quality	3	3	5	11
Travel Substitution	9	2	1	12

In due course, labelling and categorizing of the themes became a form of indexing permitting the interview transcripts and observation notes to be handled by a computer program written for the occasion. [45]

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[45] Called "themes" this program was written with the help of computer staff at the Simon Fraser University computer centre. The author acknowledges particularly the work of Margaret Sharon, consultant at the SFU computing centre, who designed the

Similar methods for aggregating data have more recently been introduced by Miles and Huberman, [46] who make extensive use of the computer to handle qualitative data. The program was written in Textform, a text-formatting computer program used by authors of theses and dissertations. The computer program designed and written to enable categorizing notes and transcripts is not the central thrust of this thesis, however. Similarly, the content of the interviews and the documentation gathered in both case studies, which permitted the development of a thematic in-process approach, are not considered as important for purposes of this thesis, as the application, adaptation, and formulation of a method which departs significantly from existing needs analyses and evaluation methodologies. The adapting of this methodology revealed to the investigator, a number of insights both appropriate for the actual case studies, and useful in guiding future research in such cases. A presentation of such insights is one of the principal tasks undertaken in Chapter Six.

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[45](cont'd) program as it was originally used.

[46] Matthew B. Miles and A. Michael Huberman, Qualitative Data Analysis (Beverly Hills: Sage Publications, 1984).

III. Summary

This chapter has presented two contemporary case studies. Each documents the procedures used for information gathering relative to the needs for communications technologies in two different health care contexts. In both cases, an open-ended interview method was chosen. The two studies led the researcher to formulate a revised method, based on the grounded theory approach for gathering and categorizing data. This, in turn, led to the formulation of a technique for labelling and grouping themes as they emerge, making possible theoretical formulation from in-process research.

F. Chapter Six: Analysis, Summary and Conclusion

Introduction

This chapter addresses the fourfold task of summary and synthesis, analysis and conclusion. The task of synthesis will be facilitated through frequent references to the material already presented. The range and variety of material presented in the three different studies and reviews of associated literature bases have made possible the introduction of analysis throughout previous chapters. Where this analysis aids in showing the relationship of the various elements to the whole thesis, it will be reintroduced in this chapter to substantiate the findings which go beyond those of the three individual studies. An important precursor to the analysis is the presentation of the theoretical framework, which is outlined in part two.

One of the first tasks of this chapter is to show what linkages there are between each of the three studies. This task is made easier through a review and summary of each one of the studies, and through a description of the conceptual framework already mentioned throughout previous chapters. Once the framework is redefined in the light of all of the information gathered in the case studies and literature reviews taken

together, then the overall conclusions can be drawn.

The first part of this chapter summarizes the three studies presented in Chapters Three and Five. The second part of the chapter describes the theoretical framework which underpins and guides the revised approach. The choice of the approach is discussed briefly, in the light of the literature reviews presented in Chapters Two and Four. The third part reviews the approach and demonstrates how it was tested in the third and last study. Here the findings of the third case study are discussed in more detail. Examples of the themes which were identified in the third study are re-introduced, particularly as they point out areas for future research, and present potential for future development of theory. The significance of grounded theory as an aid and an approach in pursuing similar studies is also underscored in this section.

The final section of the chapter presents the study's overall conclusions. Because this study has been exploratory in character, the conclusions indicate the areas for future research, stressing the need for such research particularly in the light of current experiences in introducing and evaluating communications technology in the public sector.Finally, through a summary of the findings of the three studies, the contributions made by thesis are outlined, and recommendations are listed, pointing out the most important areas for future study.

I. Part One: Case Study Review and Summary

Chapter Three presented a reevaluation of the Canadian telemedicine experiments and pilot projects which utilized satellite technology as the principal telecommunications link.

Each of the satellite telemedicine experiments in the first study took place in a different setting, but important similarities emerged. First, all had their genesis in some aspect of the Canadian health care sector, and all originated in a university faculty of medicine. Second, all were carried out as a result of a process of solicitation by the federal DOC for social experiments using satellite technology. Although one of the experiments was preceeded by a type of needs assessment, it is safe to say that the experiments or pilots were not conducted as a result of demonstrated need for additional communications services or links. Third, each was short-lived; none evolved into a long-term service. It was the evaluation of the projects, however, which was the main preoccupation of the first case study.

Evaluation Problems: A Summary

Through the meta-evaluation review used to reassess the satellite telemedicine projects, several problems in reference to program evaluation were identified. For example, the evaluation results did not report a range of the effects produced by the pilot or experiment. This is partly due to the immaturity of the projects and partly due to the apparent inadequacy of the evaluation method chosen, and to their exploratory nature. Many of the evaluation problems identified were due to the lack of precedence for this type of experiment or project.

Introducing elaborate communications technology systems in a health care setting has been described by some as innovative. For purposes of this study, an innovation may be an invention, a new process, object or idea, or a combination of these. Innovation is a concept which contains two components: one is the idea or item itself, and the other is the change that results from the adoption of the item or idea. [1] Of central interest to this study are the problems associated with the evaluation of projects which engender change.

When an innovative process, item, or system (such as a new telecommunications system) is introduced, changes occur which are difficult to predetermine and measure. Thus the evaluation

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[1] B.S. Sheehan, ed. Information Technology: Innovations and Applications (San Francisco: Jossey-Bass Inc., 1982),pp.89-104.

of the innovation is made more difficult because of the element of the unexpected. It is difficult to account for this element in most types of evaluation methodologies. The evaluation procedures used were all based on the evaluation paradigm, which is characterized by measurement of a project or program's performance and capacity to reach preset objectives. But, when innovations such as communications technologies are introduced in traditional settings, they tend to produce unplanned effects, making the measurement of preset objectives unattainable, as new factors emerge which influence or overshadow the original goals envisioned for the project.

Secondly, although one of the rationales used by proponents of program evaluation is that evaluation is justifiable because it is needed as a basis for policy-making. there is little evidence that evaluation results are used to guide decision making. This problem however, is by no means confined to program evaluation studies. [2]

Thirdly, except for one of the evaluation reports reviewed (focussed primarily on tele-education) a theoretical perspective for the evaluation of the communication experiments or pilots was not made explicit. This absence of theoretical perspective meant that experimenters, project directors and evaluators could choose methods for evaluation which underscored the current practical orientations of the medical and educational settings

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[2] Laurence Lynn, ed. Knowledge and Policy: The Uncertain Connection (Washington, DC: National Academy of Science, 1978).

in which the projects were situated. Moreover, the lack of theoretical perspective not only did not permit questioning of the project's value or appropriateness at the outset (for presumably all would be revealed in the evaluation results), it did not permit findings to be interpreted against a substantive theoretical basis.

The gap created by the lack of theoretical perspective is linked to a fourth evaluation problem, that posed by value orientation which is closely intertwined with the very act of evaluating. Valuing is at the basis of evaluation. To evaluate is to estimate worth or merit. In those projects or programs where competing values and paradigms exist, the dominant value system predominates and guides the choice of method or criteria by which a program is judged to be a success or a failure.

A fifth evaluation problem occurs when competing paradigms within the field or scientific discipline of the project's orientation influence the choice of evaluation methodology. Competing paradigms (e.g., in health and medicine) are at times in conflict in the context of the health care system, for each may exhibit particular needs for pertinent information. Indeed, the context of the health care system itself was not given adequate consideration in the implementation and evaluation of the telemedicine projects.

A sixth evaluation problem therefore presents itself when the context cannot be taken into account. Health care system experiments, innovations, pilot projects and new programs are

generally introduced in what is a rich, varied and changing context, which influences meaning and considerably alters projected outcomes or goals.

Political realities and territorial imperatives are also part of a changing context in which perhaps only the fact that there is an end user is a constant. For the end user of the communications system, whether he/she is a nurse, physician, receptionist, patient or member of the general public, is the link between the information and the ultimate client. In the health care delivery system, the patient is the ultimate client.

In the evaluations of the telemedicine projects reviewed, views from end users were occasionally obtained, but their needs for a communication system were rarely considered prior to the implementation of such experiments. Yet, the rationale for introducing communications technology was often that the technology is needed by end users to fill some information and communications gap.

These many problems with evaluation of the Canadian telemedicine experiments and pilots led to the conclusion, in this study, that a revised approach to introducing telecommunications technology in health care was needed. On the basis of the first study, and in considering some of the evaluation reform literature, it was proposed that any new approach to evaluating communications technology projects in the health care field must take into account the problems listed above, that is, the approach must consider the context and the

user, it must allow for the emergence and examination of unplanned effects, and it must produce information accessible to the decision makers in a form as accurate and as contextual as possible. The information should ideally be available in process, as well as after-the-fact, enabling decision making about the current project or future planned experiments or projects. As well, it must be based on a theoretical basis. Ideally, it must also permit the views of most, if not all, identified stakeholders to emerge in the course of all phases of the study. For this reason, it must be an approach which is usable at all stages of a project's implementation, from planning to evaluation phase.

The new approach, then, must be able to capture and interpret data related to needs, to issues, and to assessment.

Planning and Need Determination

One way to reexamine the rationales and the criteria used for the implementation of new communications technology may be to review the genesis of such projects. It was possible to do this only after the fact for the telemedicine projects, and then, only a limited amount of information emerged from this review. Even so, the review did show that the experimental telemedicine systems appear to have been introduced in the absence of demonstrated need for them. If needs could have been identified, and genuine attempts made to design a communications

system accordingly, such innovative projects might have been more successfully planned, introduced, and executed.

In an attempt to define and articulate need for communications technology, two separate processes were put in motion by the federal Department of Communications (DOC) over a period of approximately nine years (1975-1984). First, the DOC set up demonstrations or experiments in order to stimulate use of the technologies, particularly satellites, for communication projects in health. When these demonstrations failed to produce important, long term commitment on the part of the health care community in innovative telecommunications applications, the DOC commissioned a user requirement survey (reviewed in Chapter Four). [3] The report from this study reiterates what is commonly known about the Canadian health care system and its adoption of communications technology: that is, many opportunities exist, but there appears to be little or no unity or coordination in communications activities between regions, between professions, and between institutions.

More than one author, and government officials (Martin, 1982, 1984, and Green) have repeatedly recommended that individual needs analyses and determinations must take place prior to implementing communications technology systems. A review of needs assessments reports in reference to the

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[3] Entitled Uses of Telecommunications within the Health care System , this study was conducted by the firm of Woods Gordon and although dated November 1983, it was transmitted to the DOC on February 28, 1984.

implementation of communications technologies and other government projects in the public sector (Chapter Four) demonstrates that no one specific methodology is available which had successfully been applied for such an assessment. Because some telecommunications projects in the US had been implemented following needs assessments or surveys, a review of this literature was conducted. This review produced questions similar to those which arose as a result of the review of program evaluation literature reported earlier. Although a range of methodologies exist, needs determination and analyses procedures do not necessarily reveal the full range of problems which emerge prior to the implementation of such projects. The instrumentation used to gather needs information often either constrains or artificially lengthens an emergent list of needs.[4]

As with evaluation, the innovative nature of telecommunications projects in health care places a special burden on both the respondents and researchers conducting a survey of needs. Unlike evaluation, there is a paucity of critical literature which attempts to provide directions for reform in needs analyses procedures or research. A selective review of this literature base was done (see Chapter Four). Some authors, Kay and Kramer (1977), for example, concluded that most needs assessment techniques do not reveal authentic needs because respondents cannot envision themselves as users. Warheit

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[4] James Sallis and Scott Henggeler, "Needs Assessment: A Critical Review," Administration in Mental Health 7(1980):200-209.

et al. identified four major barriers preventing the identification of needs by members of a given community, including inertia or resistance, inadequate resources to meet an overwhelming list of needs, interrelated needs which were difficult to set as priorities, and perpetual transition giving rise to shifts in perceived needs. [5]

Although the needs assessment literature is less broad-based that that provided for program evaluation (see Chapter Two), there are striking similarities between the technical and ethical difficulties in program evaluation and needs analysis techniques. For example, the same paradigm issues attend needs assessment procedures, for various professional groups are expected to overstate those needs which might benefit their specialty. [6] As an example of professional influence, Howard, points out that some characteristics of the medical system in particular, one-way communication, elitism, and power hierarchies tend to prevent the involvement of nonmedical people in the process of studying and assessing needs. [7]

As with program evaluation results, there is considerable comment in the literature which disputes that decision makers actually use the results of needs analyses to implement

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[5]George J. Warheit, Roger A. Bell, and John J. Schwab, "Needs Assessment Approaches - Concepts and Methods," (Rockville, MD: National Institutes of Mental Health, 1977.)

[6] Sallis and Henggeler, "Needs Assessment," (1980).

[7] Donna M. Howard, "Health Education Needs Assessment in an HMO: A Case Study," Health Education Quarterly 9(1982):23-41.

projects. Varenais states that the assumption that needs analyses results is useful information for decision making needs to be questioned. [8] Shapek also states there is little evidence to suggest that ordering needs permit decision makers to plan programs more effectively. [9]

In order to test these findings and to determine how the similarities and linkages between program evaluation and needs analyses manifest themselves in a practical sense, it might be necessary to produce a meta-analysis study similar to the one conducted for the evaluation of the telemedicine projects. No such opportunity presents itself since no substantial body of needs assessment reports exists. Because of the links which exist between program evaluation and needs assessment methodologies, it was suggested that a revised approach should ideally consider both needs and results and might be appropriately adaptable to both phases of a project: that is, the needs analysis phase and the evaluation phases. A revised approach was formulated and tested through the two contemporary case studies which are summarized below.

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[8] Kristine Varenais, "Needs Assessment: An Exploratory Critique," Office of the Assistant Secretary for Planning and Evaluation, DHEW, Washington, DC, 1977, p. 9.

[9] Raymond A. Shapek "Problems and Deficiencies in the Needs Assessment Process," Public Administration Review 35(1975):754-758.

Two Contemporary Studies: A Summary

The first of two contemporary case studies involved a survey conducted for a national health association to determine what telecommunications system(s), if any, might be appropriate to meet the information needs of its members. The data were gathered through documentary research, interviews of key association personnel, and through observation. Care was taken to select open-ended data gathering procedures to permit the free flow of information, and offer the respondents a wide scope for comments. The results of the study revealed there were wide variations in perception from one interviewee to another regarding the need for improved access to health and medical information via a communications system. It was also noted that the interviewees had little or no practical experience in the use of communications technologies. Few, if any, were in a position to describe what components, channels, or technical modalities might be the appropriate ones to deliver required information. Expertise, knowledge and interest in communications technologies varied greatly from one region to another or from one administrative level to another in the same organization. Thus, this study did not lead to firm conclusions and could not guide the implementation of a particular telecommunications system.

Based on the information gathered, it was concluded that much more experience is needed before decision makers and users

themselves can implement appropriate telecommunications systems to meet the varied information and communication needs which present themselves in a health care context. The information needs and patterns of use are apt to be mediated heavily by context, which, in the health care sector, is particularly rich and varied. The health association environment, although remote from the patient, nonetheless disseminates information vital to health planning, administration, and the delivery of health care.

One other tentative conclusion drawn from this study is that the usual survey procedures, including open-ended interviews, appear insufficient to guide decision makers in the design and implementation of communications technology projects in the health care sector. One reason may lie in the fact that little is currently known about the appropriate fit between communications systems and the communications needs of the health care sector.

The second contemporary study resulted from a quite different survey– one which attempted to establish the needs of a medical and health care community for the services of an existing multitechnological educational network. Using the previous contemporary study for guidance, it was possible to use a method based on the perspective provided by grounded theory. This framework permits the development of theory from data when they emerge either in the planning, implementation, operational or evaluation stages. It also allows the researcher to explore a

range of issues, needs, and concerns, and develop more refined theoretical concepts and hypotheses for exploration in future phases of a study or in future studies. Through in-process accounting and recording of the data, the researcher can analyze and recommend what directions can be taken to improve and continue research on communications.

This third and last study was to identify potential originators and receivers of health and medical programming delivered via data, audio, and video channels on satellites, cable, microwave or combinations of these. The study resulted from interviews and meetings with ninety-eight interviewees. It showed there are no simple methods for uncovering needs and no simple solutions to matching the technology to the communication needs of a segment of a health care community. Health care is a large, diverse, complex and multifaceted system within which a variety of activities related to care, administration, education, and research functions exist. The study did indeed reveal a wide range of issues and communication needs reflecting this multidimensional context.

In the preceding chapters, the complexity of the context of health care is frequently mentioned. Over and over again this same theme has emerged in both the historical study of telemedicine projects, as well as in the contemporary studies just discussed. This suggests that those conducting applied research in this context must choose methods which capture a wide range of data. A single, narrow study may reveal useful

information for further research, but will not capture the range of complexity which most organizations in the health care sector present. Neither the controlled experiment nor the overly simplistic qualitative study alone will generate the kind of information required to permit the researcher to discover or generate lasting insights.

In this situation, multiple methods can be most useful in providing the range of data needed, since each different method will uncover a different aspect of the study, adding to the pool of information required to fill in as total a picture as is necessary to yield the sound insights needed for decision-making, planning, and future research.

The results of applying multiple methods will usually produce a quantity of data, which unless grouped and ordered, become too cumbersome to be useful. It is not sufficient, however, to gather and organize quantities of data. The data must yield useful information. It may ideally lead to appropriate decisions, and the adoption of policies informed by sound research results. The information gathered must also be considered in relationship to other factors, if it is to be useful for future research, to planners or decision makers. Placing the research strategies in the appropriate theoretical framework is as important a requirement therefore, as is the choice of appropriate data gathering techniques. These methodological problems, along with the problems already listed and discussed, underscore the requirement for a framework within

which the need for communications technology in health care can be studied.

II. Part Two: Framework for a Revised Approach

There are several well-known methodological approaches for introducing innovations in the fields of medicine, or in health care generally. In medical practice, for instance, the classic procedure for introducing a new intervention, drug, therapy or diagnostic procedure is the randomized clinical field trial. [10] This procedure must follow a rigorous experimental design. The design is difficult to execute and unsuitable for those situations where no clear cut measurable outcome can be expected from the intervention. Although Lewis and Cheyovich report having used the clinical trial in a health care organization for the introduction organizational change, technology, [11] this design would be unwieldy because of the variables which cannot be controlled, and the element of the unexpected, which has already been discussed above.

The type of inquiry of which the clinical trial is a representative relies on the scientific paradigm, where a hypothesis derived from a priori theory, is verified by

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[10] An appropriate description is provided by J. Last, ed. Maxcy-Rosenau Public Health and Preventive Medicine, 11th ed. (New York: Appleton-Century-Crofts, 1980). See specifically, D.L. Sackett, "Evaluation of Health Services."

[11] Charles E. Lewis and Therese K. Cheyovich, "The Clinical Trial as a Means for Organizational Change: Report of a Case Study," Medical Care 14(February 1976):137-145.

experiment and is confirmed or rejected. [12] "When enough hypotheses deriving from a particular theory have been verified, the theory itself is believed to have validity."[13] This paradigm is the dominant one in life science as well as in the so-called hard sciences. Because it allows the scientific inquirer to deal with hard quantities and objective data, the method has acquired a respected place in social and behavioral science research. Educators, social scientists, communication scholars and policy analysts alike have adapted the paradigm and derived from it, procedures which are relevant to their own field. The clinical trial, the various tracer methods and some of the quality control procedures are examples in medicine. In Chapter Two, a review of current evaluation practice showed this paradigm is often the basis in many evaluation models.

In their treatise on the subject of reformed ways to conduct evaluation, Guba and Lincoln have distinguished between the scientific logical positivist paradigm, and the naturalistic one, based on phenomenological epistemology. They describe the

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[12] The notion of paradigm was first introducted by Thomas Kuhn. In a postscript to the second edition of his most familiar work, The Structure of Scientific Revolutions Kuhn defines the term in two ways: "On the one hand it stands for the entire constellation of beliefs, values, techniques and so on shared by members of a given community. On the other, it denotes one sort of element in that constellation, the concrete puzzle-solutions which, employed as models or examples, can replace explicit rules as a basis for the solution of the remaining puzzles of normal science. The first sense of the term, call it the sociological..." is the sense in which the term is used in this thesis. (Chicago: University of Chicago Press, 1970), p. 175.

[13] Egon G. Guba and Yvonna S. Lincoln, Effective Evaluation (San Francisco: Jossey-Bass Inc., 1981), p. 55.

naturalistic paradigm as:

> ". . .relying on field study as a fundamental technique, which views truth as . . . ultimately inescapable. Sufficient immersion in and experience with a phenomenological field yields inevitable conclusions about what is important. . . " [14]

Whereas the scientific inquirer 'fragments' the reality, the naturalistic inquirer focusses on multiple realities and their relationships. While the scientific inquirer introduces controls so as to reduce bias and effect on the phenomenon under study, the naturalistic inquirer interacts with the phenomenon, and believes that sufficient exposure to a field will yield inevitable conclusions about what is relevant and important.

Taken at face value, needs assessments and evaluations are quests for accurate ways to describe the reality of a program, project, experiment or innovation. This quest is heavily mediated by the context of the situation. In the telemedicine projects described in Chapter Three, there were many aspects to the one reality, and many views of each aspect of reality. Evaluation and assessment are descriptions of the reality of a program, whether from the inside (subjective), or from the outside (objective), whether expressed in quantities (statistics and scales) or in qualitative terms (case studies or thick descriptions).

The introduction of any technological system alters the life of an organization as well as the context and the reality of the situation. There is some evidence that some of these

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[14] Guba and Lincoln, Effective Evaluation , p. 55.

alterations, although present in the early telemedicine experiments, might not have come to light in an experimental design. Using the first case study as an example,then, many of these alterations are best described qualitatively because quantitative data alone cannot convey the many sides of the experience. Therefore, although a before and after experimental design may be appropriate for some aspects of the study, as a stand alone procedure it would be inadequate to reveal multiple, changing, dynamic realities.

Because of the unexpected results which accrue from any change introduced in the complex organization of the health care system, a model for viewing the events should ideally not be structured so that it limits the research to an examination of one kind of effect, one class of result. Any one dimension for viewing will exclude the many others, and the introduction of any communications system has multidimensional effects. As well, if communications technologies are to be treated as means to an end, they must be examined in relation to their anticipated and actual use.

Drawbacks to the scientific inquiry method for the evaluation of innovations such as new communications technologies, have caused a number of authors to call into question its suitability for assessing many of the impacts and effects which result from this type of project. There are, however, some aspects of such communications project interventions for which scientific inquiry is eminently suited,

for example, cost comparisons and some equipment design studies. The arguments against the scientific inquiry method as the sole method to be used for evaluation applies to those aspects of a study where scientific inquiry is inappropriate to capture the entire range of data, as outlined earlier in this chapter. These same arguments can be made when applying scientific inquiry to assessing needs for communications technology. Yet, for both program evaluation and needs assessment, multiple methods, both scientific and naturalistic, may yield unwieldy quantities of data. Such quantities are difficult to manipulate, yielding data difficult to analyze, and not often conveniently packaged for either researchers or decision makers to use. Often, decision makers must make choices about suitable policies and programs within very restricted time frames. This may partially explain the popularity of quantitative evaluation studies, for the results are easy to access, simple to communicate, and can be generalized to other situations.

Case study methods are often avoided because they yield such quantities of data, lengthy reports, and present unique sets of results difficult to generalize to other situations. Since one of the drawbacks to the use of case study methods and multiple methodologies is the inacessibility and the complexity of the information produced, processing and packaging of the data to yield organized, understandable, usable, information may be at least part of the answer. As well, if this technique is subsumed under the umbrella of a form of inquiry based on the

grounded theory approach, the researcher can conduct a study using a suitable framework which will permit emerging data to lead to the development of substantive theory through acquired insight. This form of inquiry has already been used by researchers in the health care sector. [15]

Guba and Lincoln (1980), in their analysis of many forms of evaluation research, conclude that a combination of the so-called responsive evaluation methodology (advocated by Stake), and the grounded theory concepts and techniques of Glaser and Strauss combine well the requirements, as they see them, for grounding evaluation research in a suitable theoretical framework, and providing the research with the advantages inherent in using multiple and naturalistic inquiry methodology. Mazmanian has also shown how this same framework can be used to assess needs.

Stake's evaluation model takes as central organizer the concerns of stakeholding audiences. [16] To be useful, an evaluation must describe the issues of its audiences. A substantial amount of time must be devoted during a study to the information needs of those for whom the evaluation is being done. [17]

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[15] For example, Mazmaniam's study on the need for continuing medical education courses (1980).

[16] R.E. Stake ed. Evaluating the Arts in Education: A Responsive Approach (Columbus OH: Merrill, 1975).

[17] An excellent review of the procedures are provided by Guba and Lincoln in Effective Evaluation.

In his approach, Stake trades off the precision of measurement in favor of the usefulness of the findings to those persons in the specific context or program being evaluated. The concerns of the people involved, according to Stake, are more important than the instrumentation and the lists of objectives.[18] In the actual application of his model, Stake meets with everyone in and around the program, in short, all stakeholders. Identifying most or all of the stakeholders requires some skill in similar situations on the part of the evaluator. The evaluator must also carry out some personal observations to get a direct sense of a program's operation. Once the evaluator has a grasp of the situation, he can select the appropriate instruments and apply them. The instruments are most often human.

In Stake's model, the direct ongoing involvement of the persons who will be affected by a program is most important. He also recommends presenting the information to the audiences in a language which will be clearly understood. The Stake model of evaluation combines well with the notion of grounded theory.

The grounded theory approach which has already been discussed in Chapter Five, was advanced by Glaser and Strauss in 1967.[19] Suggested methods for applied research using this

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[18] Blaine R. Worthern and James R. Sanders, eds. Educational Evaluation: Theory and Practice (Worthington, OH: Charles A. Jones Publishing, 1975).

[19] Barney G. Glaser and Anselm L. Strauss, The Discovery of Grounded Theory: Strategies for Qualitative Research, (Chicago: Aldine Publishing Co.,1967).

framework were crystallized by Schatzman and Strauss in 1973. [20] Finally, Guba and Lincoln tied the notion of grounded theory to program evaluation methodology. In the approach, theory is formulated from data obtained in the course of conducting the research, rather than prior to it. Claiming that advances made by quantitative research in the social sciences had "initiated the zeal to test unconfirmed theories with the 'facts'," Glaser and Strauss take as their departure point that there is no fundamental clash "between the purposes and capacities of qualitative and quantitative methods or data." [21] Instead, they find that the difficulty rests in the concern with emphasis on verification rather than on generation of theory. Both quantitative and qualitative forms of data are useful to the generation of theory, and in many instances both forms are necessary. As stated earlier, different research methods and data collection techniques will uncover different aspects of a study. No aspect is considered unimportant in yielding a total picture. Therefore multiple methods are recommended.

For purposes of this thesis, the principal focus taken in the approach recommended for the type of study conducted is qualitative, although future applications may incorporate both qualitative and quantitative data gathering procedures.

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[20] Leonard Schatzman and Anselm Strauss, Field Research: Strategies for a Natural Sociology (Englewood Cliffs, NJ: Prentice Hall, 1973).

[21] Glaser and Strauss, Grounded Theory, p. 17.

In generating grounded theory, the researcher goes to the field with a minimum of predetermined assumptions. A continuous process partially controlled by emerging data is set in motion as the researcher collects information, which is used to discover relationships and help formulate or arrive at theory. The researcher may begin with a partial framework of local concepts, designating a few principles of the structure and processes in the situations to be studied. As data are gathered, organized and ordered, categories are created, under which the data, once coded, are classified. As the categories enlarge, patterns of information emerge and are examined by the researcher, who can then begin to formulate new concepts or even new theories. These theories are then tested for fit, which means that the theory must correspond closely to the data to be applied in daily situations. Theory must also fit the substantive area in which it will be used, and be understandable to the people working in the area.

The process of data collection, inspection and categorization, followed by pattern recognition to formulate theory requires the researcher, depending on his own particular level of expertise, professional orientation and experience, to devote a substantial amount of time and energy to refine an understanding of both the context and the milieu – the ground of the research – as well as the substantive and formal areas of the inquiry. In this case, the area of formal inquiry could center on communications theory. The areas of substantive

inquiry could include evaluation, assessment, communication system design and the organizational changes which are introduced.

Because the contexts within which the field of interest is concentrated in this study, that is, medicine, health and communications, are dynamic and so complex, the refinement of substantive theory as data are being gathered seemed most appropriate for a study of how to assist health care users to approach implementation- or rejection- of communications technology in specific health care agencies, institutions, and disciplines. The contemporary case studies presented in Chapter Five do not pretend to be classic examples of the full exploitation of the grounded theory approach, which involves the concurrent collection, coding and analysis of data as well as the development of categories for the data collected, and the identification of properties, which are conceptual elements of categories of data. [22] The original purpose of the inquiry was to develop an approach and then provide direction for future research in this field. The final case study also provides a testing ground for the approach. The full deployment of the grounded theory strategy also requires that the approach be followed through to the development of appropriate theory for future testing. While this is feasible with the data collection procedures used, only examples of suggested research directions

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[22] Complete descriptions of these procedures are available in Glaser and Strauss, Grounded Theory and Schatzman and Strauss, Field Research.

are provided the present study.

In the next part, the task of exploring and analyzing some of the consequences of the approach and its results (as they emerged in the course of the third study) is undertaken.

III. Part Three: Approach and Analysis

Why Consider Needs

From a long list of issues associated with program evaluation, one central problem has yet to be explored more fully. That is, could program evaluation procedures, whatever their methodology or framework, serve to mask the rationales for unsuitable, inappropriate, even harmful programs? House for example, concludes his review of evaluation by stating:

> "The most frequent defect in an evaluation is a moral one. . . . Obligations to the larger society are frequently overlooked. The evaluation of public programs is clearly a situation in which such obligations do exist. . . ." [23]

Similarly, a project or program founded on what might be inappropriate rationales [24] could be judged through suitably rigorous program evaluation procedures to be meeting its stated objectives, and even to be effective, viable and well administered. This suggests that any reexamination of program evaluation must go well beyond the issues of method alone. Indeed, in the rhetoric which accompanied the introduction of new communication projects, the rationale often given is that

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[23] Ernest R. House, Evaluating With Validity (Beverly Hills: Sage Publications, 1981).

[24] Examples abound in transportation, defence and medicine.

the technology is needed. Hence this problem could be explored in greater depth by examining the dimension of need for a program, project or pilot. [25]

The various communication projects previously evaluated, in particular, the telemedicine projects using satellites (case study number one, Chapter Three), were introduced in the absence of established need. Could these projects have failed to become long-term operational programs because they were technology-driven and not need-driven? Could the evaluations have been validated [26] if the rationales for the implementation of the telemedicine projects had been based on identified need? If users had been consulted could such projects have been instrumental in improving health care?

These and other questions could not be answered in referring to the literature alone. Although many improvements have been introduced to the existing evaluation models, few, if any, have been applied to evaluating telecommunications projects. We have seen in Chapter Two that each evaluation improvement spawns yet another theoretical or practical methodology problem which engenders yet another revamped evaluation model. Could a search for an improved approach end,

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[25] In the foregoing we have not distinguished between project, pilot, experiment or program because essentially the same evaluation procedures and methods are usually employed to assess any of these.

[26] Validate is used here in the sense provided by House (1981), who takes validity to mean something like "worthiness of being recognized," and throughout his review equates validity with what is judged to be true.

if the approach were sufficiently flexible to be used in all phases of a study, from needs assessment to final evaluation?

The two contemporary case studies (Chapter Five) provided the answers to some of these questions. First, it was possible in both the studies to design and use an open-ended methodology which placed the user's concerns and needs at the centre. User needs became the central organizers. Secondly, it was demonstrated in the last study, that even in the absence of a priori assumptions, the data collection procedures could be rooted in a conceptual framework which may be used to guide the formulation of new theory.

The Framework

The grounded theory perspective described in the previous section needs no further description, but its suitability as a framework to guide the type of study undertaken in Chapter Five may need further emphasis. Many problems normally confront the researcher who enters the field to study a complex problem. Assessing need for communications technology is an example of a complex problem. [27] The complexity is exacerbated by the rich dynamic of the context of health care, which has been described fully in earlier chapters.

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[27] Four aspects of this problem are described in a recent article, that is, the fourfold problem of needs determination, system selection, implementation and assessment. Jocelyne Picot, "Telecommunications: the Market is Ripe," Dimensions in Health Service 60(September 1983):52-53.

When entering the field (of health care) it is tempting to seize upon a problem area (in communications) and propose to remedy it with communications hardware. Insufficient knowledge or experience in the context may prompt such a response on the part of the investigator or field researcher. Yet, a wider more indepth knowledge may not reveal to the investigator what the solution to the problem is, it may simply provide him with more data. It is with these increasing amounts of data, however, using the grounded theory framework, that the researcher can often explain emergent phenomena and effects, placing the data in perspective. The growing information base which the researcher uses to draw better insights advances the level and depth of the research exploration by a few steps each time, adding to the general pool of information about the problem area, and continuously informing the researcher regarding new avenues for conceptual development and research. Thus, the very uncertainty which attends the genesis of any such study can be used to advantage, for it prevents the premature formulation of theory or hypotheses-to-be-proven, yielding information with which to fomulate more plausible, relevant and significant theoretical and conceptual knowledge. and allows for a full disclosure beyond what would be possible in deductive models.

Why End User Input

It has been taken as a given that end user input is of primary importance in the collection of assessment information. No clear cut evidence exists from previous studies to justify attaching more importance to user perspectives than to, say, expert opinion. Some say the user bias will distort the emergent data. Others say users are not equipped with the technical expertise to make informed decisions about technology. However, the choice of user as principal stakeholder (in Stake's terms) seems justified in the light of their key roles in information (content) transfer and utilization.

It goes without saying that all communications systems are (or should be) designed and implemented to carry content (as information or as data) from sender(s) to receiver(s), although in practice the use pattern is never quite as simple as this straight line equation. In an information or content-transfer communications system, the link between data received and data communicated or used is the end user. As mentioned earlier, such an end user (whether receptionist, nurse, physician or patient) is vital to the communication chain, which lies dormant until information is sent and is broken if no end user receives or transmits.

Previous telecommunications projects appear to have been implemented with little regard for the role(s) various end users play in utilizing data transmitted. As an example, in the

telemedicine (satellite) case study, it was reported that hours were filled with spare content, and receivers in remote areas were not necessarily consulted in the choice of programming. If end users were to be given adequate input concerning what and how telecommunications systems are to be designed and implemented and what is to be communicated, it can be assumed that the system in its operational phase has a greater chance for appropriate use than one which has been designed and implemented without user input, all other conditions being equal.

However, placing the user as the central focus of a study of needs is not without problems. It has already been shown through the contemporary case studies presented in Chapter Five, that users often not familiar with communications technology and systems, may even be unaware of communication problems in their own milieu, thereby making it difficult for them to articulate what they need in a communications system. Moreover, users who are stakeholders with interests which are at variance with other users of the same system can easily express needs which are biased or based on self-interest. All stakeholders who have influence or power by virtue of their position in the hierarchy of the health care system may express needs, which, if fulfilled, may permit them to monopolize the communications system for their own use.

Since the participation of the end user as informant in needs assessment and evaluation is essential, the question must

be explored further to see if checks and balances are available to prevent the information or communication system designed for multiple users to be controlled by only a powerful few.

Of the several ways in which user input can be effectively obtained and used, the creation of open-ended in-process mechanisms for communicating needs, views, issues, and concerns seems most apt. Here, user input can be compared to citizen participation. Wilson and Neff in their study of the social dimensions in transportation assessment presented an extensive review of citizen participation and list the favorable and unfavorable views towards it. [28]

In describing a variety of techniques for participation, they decry the inadequacy of the survey questionnaire as an effective instrument for obtaining participation, and they outline some ways in which government, for example, can encourage participation through changes in information collection and dissemination, and changes in citizen education.

User as Participant

The introduction of technology in the workplace and in various human service institutions has recently given rise to the term user-driven in designing systems and equipment to meet

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[28] Tay Wilson and Charlotte Neff, The Social Dimension in Transportation Assessment (Aldershot: Gower Publishing Co., 1983).

user requirements. [29] Such a term implies that systems must take into account human factors and must ideally be designed with the user in mind, without giving preeminence to hardware factors. These automation systems as well as all telecommunications systems in health care must reflect, it is assumed, user input at all pre-installation phases. The involvement of end-users in this type of study has more serious implications than for studies where the user ceases to be subject-participant as soon as data-collection procedures are over. In studies which involve technological change, user participation is vital, since the user may well be the focus of any change introduced as a result of the technology being implemented. Well-informed users who engaged in the process of a study in anticipation of change may effectively avoid victimization which often results from inappropriate technological implementation.

In the face of the need for user input, user apathy must sometimes be overcome. Ensuring that user input is obtained is as important as another problem, that of ensuring that the information, once obtained, is accessible and usable.

In order to address this problem the end user must see himself transformed (perhaps through education) from a passive observer into a participant in the process of assessment of need. Here again, the grounded theory methodology seems appropriate, since the inquiry will be conducted using a range

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[29] Don Tapscott, Office Automation: A User-Driven Method . (New York: Plenum Press, 1982).

of methodologies, many of which permit the researcher to reenter the field frequently, stay in touch with subjects, even be a resource person as needed, adapting to the circumstances.

Using the Data

One way to address the second problem, that is, ensuring that the data gathered are used, is to decrease the distance between the user and the decision maker, making data gathered through user-input as readily accessible to the decision maker as possible. Wilson and Neff describe a data input mechanism which they called the apple basket approach, where commentary is sorted into ideas and divided under reasonable and communicative sub-headings. The authors state that it is very easy to distort, even suppress this information, by applying quantitative analyses and other transformations. So it becomes extremely important to try to keep the information intact and make it readily accessible to the decision maker in its original form. The thematic indexing procedures used in the data gathering method of the third case study permit all parties, from user-respondents to decision-makers, to access the data in its undistorted form.

The foregoing discussion has sought to explain why the grounded theory framework has been found useful for studies about the introduction of communications technology in health care, why the end user must remain the central focus of

information gathering, and in what ways the data gathered in interviews, observations, and documentary research can be made readily accessible to decision makers and stakeholders alike. The following paragraphs describe how theory can be formulated from the data emergent in the needs assessment procedures. For this discussion, selective use will be made of the findings of the last contemporary study, taking examples from the themes which were identified as the data emerged in the course of the study.

From Data to Concept: Some Examples

Schatzman and Strauss have described somewhat elaborate procedures for coding, classifying and organizing emergent data so that theory can be derived from the data. In the last case study described in Chapter Five, much simpler data collection procedures are described. Briefly, the narrative and observation notes are scrutinized for content and categories are created. As part of the present study, themes were identified, which are analogous to the categories described by grounded thorists. As themes are identified, their names are inserted as labels in the transcripts and notes. Using these steps, the second case study produced some fifty-five themes which have already been listed in Chapter Five.

To show how the themes, as categories, aid the researcher to develop theory for on-going research, an example from the

last study may be used in order to explore further one of the recurrent themes, that which concerns funding. For purposes of this discussion, the question is, in what way could emergent data about this issue allow theory to be developed? Glaser and Strauss describe two types of theory, substantive and formal:

> "By substantive theory we mean that developed for a substantive, or empirical area of sociological inquiry, such as patient care, race relations, professional education, delinquency, or research organizations. By formal theory, we mean that developed for a formal, or conceptual, area of sociological inquiry, such as stigma, deviant behavior, formal organization, socialization, status congruency, authority and power, reward systems, or social mobility. Both types of theory may be considered as 'middle-range'. That is, they fall between the 'minor working hypotheses' of everyday life and the 'all-inclusive' grand theories." [30]

In the current study, substantive and not formal theory may be generated. Examining the transcripts closely we find that the notations regarding the issue of funding (for telecommunications systems) are mentioned in two different contexts corresponding to actual and future perspectives. In the present context, interviewees made comments[31] regarding current funding cutbacks in the health care sector, which increased their concern for future funding of new programs, thereby calling into question the feasibility of a communications system. The remarks about costs in a future context are driven by this same concern, which turns around the issue of cost-effectiveness of communications systems to deliver health information currently communicated in

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[30] Glaser and Strauss, Grounded Theory, pp.32-33.

[31] The actual comments, mostly taken from interview notes, are listed in Appendix B, as an example.

more traditional, perhaps less expensive, ways. Some of these comments are negative (e.g., "programs are costing more and more to produce"), some comments are positive (e.g., "an institutional fee is more favorable . . ."), and still other comments are neutral (e.g., "the per-person allocation in each hospital permits every department to have funds. . .").

From an examination of the data assembled under the theme funding, in spite of the frequency of reference, the researcher is not yet ready to formulate a new theory about, say, the value of communications systems or their cost-effectiveness. However, with more inquiry directed at this topic, and "continual intermeshing of data collection and analysis," a "reasonably accurate statement on the matters studied" which is "couched in a form possible for others to use in studying a similar area" can be achieved. [32]

The steps which precede the formulation of theory, must lead the researcher to believe that enough data are available to bring the research to a close. Glaser and Strauss have described what they call the saturation of categories of data. When saturation has occurred, the researcher is said to have enough data to arrive at the formulation of theory. This is not the case in this instance, due to the exploratory nature of the contemporary case study under examination. Nonetheless, the process described above shows the promise of this methodology for arriving at appropriate theory in similar studies. The

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[32] Ibid, pp. 224-225.

framework seems particularly useful in this topic area, since so little is known and prior information is scant on the subject of communications technology in the context of health care. Similarly, several more themes can be drawn from the list which emerged in the last study, and selected themes can be explored for further study, prior to formulating concepts or new theory.

One area which may warrant further study is the the area of need, and the issues and questions which arise as a result of attempting to determine and interpret user needs. A review of the literature has already been presented in Chapter Four, but little appears to be known about user needs in relation to communications technology, or improved communications through technology, particularly in health care organisations. Because of the nature of the open-ended questions which were posed during this study, a proliferation of needs were identified by the respondents. The themes which reflect these items sometimes refer to content (e.g., educational needs, or possible topics for programs), sometimes to technology (e.g., needs for a "scrambled service"), and sometimes to general needs in reference to health care (e.g. patient education). The expression of these needs may lead the researcher to compare and rank them in order of their importance against some ideal communication model, in this or another context. However, as has already been discussed at some length in Chapter Four, many ambiguities surround the concept of need and its definition, the differentiation of real versus stimulated needs or of needs

versus wishes. The richness and variety of data produced through an open-ended survey of needs however, may well enable the researcher to explore this area further, probing for the insights which yield new levels for research questions and theoretical formulation.

One last example from the list of themes will serve to illustrate how the themes which were produced in the final study can inform future research. The general subject area of confidentiality in health care was mentioned several times by respondents, which opens the possibility for a number of new research questions to be posed in relation to the use of sophisticated communications technologies and networks in the health care sector. There may well be a large gap in the patient's understanding of confidentiality issues, as well as in the practitioner's or the medico-legal expert's view of confidentiality. Dangers to patient privacy through loss or manipulation of patient records seemed to be a concern of some of the respondents, and not to others, who downplayed the issues surrounding confidentiality and privacy. It may well be that the implementation of communications technologies on a massive scale in the health care field will change the traditional relationships of trust between patient and professional, leading to new unforeseen problems and issues regarding confidentiality. Thus, the data helped point out for the researcher, a new area of substantive inquiry in health care communications.

The examples or possibilities for future research were informed by the list of themes which emerged from the final study. As with some of the other findings of the entire thesis (listed in the next section), they provide new possibilities for posing research questions. The examples of research possibilities drawn from the list of themes show that the process of data collection and theory generation described above, in reference to a contemporary case study, utilizes a framework adaptable to several phases of research within the same study, can indeed inform the researcher and help guide the course of future studies by providing new topic areas for inquiry. As well as providing new avenues for research, the grounded theory approach permits the adoption of methods and techniques suitable to the context and situation, and hence, seems most applicable to the case of evaluating communications in health care, for the several reasons which have already been outlined earlier in the chapter.

The method proposed in this study was applied to an open-ended survey of needs. In this method is seen a new potential for the approach to be used in a continuous process of data collection, perhaps throughout a project's lifespan. Hence this approach can be as useful for ongoing evaluation of a project as it is at the stage of inception or pre-implementation.

One of the other reasons for using the procedures for the contemporary study presented was to demonstrate how the

communications technology itself might be used to aid in the gathering of data about the technology. There are several precedents where such data gathering procedures have been implemented with the help of computers, for example. Various forms of electronic journalism have been used for such purposes and a current example is found in the way interest groups (e.g., in education) use computer conferencing to discuss issues of common and current interest. In a continuous process of inputting data, an ongoing process of data collection is provided to the users.

In the recent past, the evaluation of the Inukshuk project, which had used the satellite Anik-B for broadcast in the North, provides yet another example of how the technology can be used to gather information about the technology itself. As part of the evaluation, the satellite was used to gather information from participants about their project's experience. A live interactive session was used, in which participants were able to freely discuss their reactions to the project. [33]

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[33] Gail Valaskakis et al. The Inukshuk Anik-B Project: An Assessment (Ottawa: Report to the Department of Communications Inuit-Tapirisat of Canada, 1981).

IV. Part Four: Summary and Conclusions

Summary of Chapter

This chapter summarized the findings from three case studies and placed particular emphasis on the final case study, for which an approach was formulated and adopted, based on the grounded theory perspective. Examples from this study were used to point to areas for further research. The theoretical perspective was described, along with the method developed to gather and aggregate data from open-ended interviews and notes. Although the approach was used in association with needs determination, the framework, it was concluded, can be used for all phases of a study, and is particularly suited to in-process collection of data.

The role of the end user was described, and the importance of the consideration of context was underscored. Examples were drawn from the health care sector where the context is complex. All three case studies took place in a different aspect of the health care sector. Finally, the importance of discovering theory when introducing innovations was emphasized, as part of the analysis developed in this chapter. A detailed description of the revised approach for evaluation and needs determination was given.

Summary of Entire Study

The subject under study– telemedicine and telecommunications in health care in Canada– was introduced in the first chapter which overviewed the entire study and described the background contexts relevant to the study: health care in Canada, telecommunications and evaluation. The methodologies were described, and the assumptions and limitations of the study were listed. Following this, the second chapter presented a review of program evaluation literature.

The first study was an examination of satellite-linked telemedicine projects in recent Canadian history, as developed from a critical assessment of the methodologies used for evaluating these projects. The critique was done using a meta-evaluation technique to review all of the experiment reports and evaluations. A subsequent chapter reviewed other telemedicine projects and concluded that to evaluate such projects, a different approach was needed.

Two contemporary studies, each representing a different facet of the health care system, as well as different time-spans, were presented in Chapter Five. The first of these provided a platform for developing a better understanding of the role of the end user. Within this first contemporary case study, it was possible to interview stakeholders in association with the development of a plan for a national health network. This

study revealed that users were often unable to suggest in what way communications technologies might be used to improve communications. However, it was in the course of the second study that a new approach, designed to obtain a wide range of interview and observation data in an unconstrained way, was partially tested. The approach is based on the framework suggested by grounded theorists, who develop theory through a method of discovery.

In summary, the thesis makes several contributions. First, the reevaluation of previous historical evaluation studies leads to a critical assessment of program evaluation methods for the evaluation of innovative and communications projects or experiments, particularly in complex organizations and contexts. Secondly, the thesis develops an approach which can be used at all phases of a study, from needs assessment to final evaluation. The approach developed is used in association with a computer program to capture and categorize narrative data. The data produced in the third and final study, classified as themes which emerged principally through interviews, led to recommendations and directions for future study, based on the identified themes. The study's critical review of the program evaluation and needs assessment literature, together with the thorough review of the telemedicine and telehealth literature and reports provides a contribution to the literature which will also be useful for future research, as well as for planning and decision-making.

Shortcomings of the Study

Other than the limitations listed briefly in Chapter One, the theoretical perspective and the method used to develop the three case studies in this thesis present certain other shortcomings which should not be overlooked.

In looking at the overall study, it is evident that the use of multiple methodologies have made the analysis difficult, and subject to the biases and limitations which are inherent in each one of the methods used. In particular, the interview strategies used and the method of aggregating and labelling the open-ended data are both somewhat subject to researcher preference, and no two researchers conducting this same study and using the methodology described and developed in Chapters Five and Six would obtain exactly the same results. As well, researchers with varying degrees of expertise and different professional orientations may look for different clues in the organization and emerging patterns of data. However, in the process of interpretation and analysis, the significant themes are expected to emerge, if procedures are sufficiently open-ended and categories well saturated, in the manner described by the grounded theorists.

Another important weakness of the study lies in the dissimilarity of contexts: telemedicine in Northern Canada, a national health association, and a university medical community.

Moreover, the lack of uniformity in the approach to each weakened the linkages between the sub-studies, and threatened the development of the step-by-step explanation necessary to draw major conclusions. Future studies based on these conclusions would indeed still be exploratory.

Another difficulty more obvious than the above is that presented by the scope of the overall study, which takes the reader through the three cases which are all at different phases of study: from needs assessment or pre-implementation, to final evaluation, through the dimensions of an historical study, and two contemporary ones, all with their associated literature reviews. The researcher or reader who has been trained to reduce reality to more manageable proportions for study, will find this overall dissertation at best, cumbersome, at worst, diluted.

In practice the grounded theory framework also presents some inherent difficulties, few if any of which are addressed in this study, since the approach is modified and only partially tested in one of the cases. The first of these relates to the methods recommended for data collection. The inexperienced researcher will find it difficult to know how much data are enough, and may be unable to bring the research to a close (in spite of the elaborate procedures Schatzman and Strauss describe to achieve this). Secondly, the grounded theory approach assumes a relatively open mind is adopted prior to initiating the study. In a researcher with any degree of experience, knowledge or background, some prior knowledge and training will be applied,

since all researchers have perspectives, viewpoints, even biases, prior to beginning a research project. The open mind idea also assumes that relatively little a priori knowledge or framework (other than that provided by grounded theorists) is necessary. Yet, it has been argued that sound evaluation research must be guided by theory. The method advocated by this study presupposes that sufficient data must be gathered for the development of theory. The central concept here is that the grounded theory approach is in itself a theoretical perspective, a framework which will allow for substantial theory to be developed. It is also suggested that there are many different types of data gathering procedures which can be used to develop theories which are to be tested further. In practice, such data-gathering can become very laborious, particularly in complex contexts such as those found in health care organisations. For this particular study, previous experience in the field of health care was helpful to the researcher, but this may present a difficulty for future such studies, since researchers will vary in background and experience, and few researchers will be familiar with the many aspects of this type of field research.

Some other difficulties with this type of study have already been described by Yin (1984) who claims that the explanation-building type of multiple case study presents the greatest difficulties for the researcher. He suggests the approach is "fraught with danger" because the "investigator may

slowly drift away from the original topic of interest." [34] Yin suggests that constant reference to the original purpose and the consideration of possible rival and alternative explanations may help reduce this problem.

In the present study, constant reference to previous (historical) projects has helped to keep the original direction focussed, but it has not been possible to conduct a full exploration of rival theories of explanation. One reason for this lapse is that rival explanations are difficult to develop when all three somewhat dissimilar cases must be considered together. Taken singly, rival explanations could have been developed, particularly in the case of the two contemporary case studies.

Another important limitation to this study, and to the methodology which it advocates, is that it leaves open the possibility for totally ignoring the larger political context. House (1978) has clearly shown, in his comparative analysis of the many evaluation methods available, that evaluation is political: indeed he attempts to show that all evaluation models share some of the basic tenets of the liberal ideology, where consumers (those affected by government programs) will choose from a free market of ideas, and presumably be led to the truth. In the case of program evaluation in education, improved education is the result, which assumes that increased knowledge

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[34] Robert K. Yin, Case Study Research: Design and Methods (Beverly Hills: Sage Publishing Co., 1984), p. 109.

will make people happy, better, or satisfied in some way. The same holds true for the case of program evaluation in health care. Because the grounded theory framework essentially centres on the user, such larger ideological questions are not addressed.

Directions for Future Study

In spite of these limitations, directions for further study can be identified by the present study. Of the several possibilities which have been presented in the course of this study only three will be mentioned. First, there is the suggestion throughout the study that evaluation results are not used by decision-makers to appropriately plan future programs. This requires further study before a firm conclusion can be drawn. Secondly, it has also been taken as a given that the user is the principal communications link between the information and the client or recipient of the information. On this basis, it has been assumed that the end-user is the central organiser, and that the user of the communications system will be able to identify legitimate interests and pressures, client needs and even appropriate system design, if needed. It may be that the client of the program or services is not the only entity capable of providing legitimate input in these matters. Thirdly, the major thrust of this study has been devoted to the development of a new approach to evaluation and assessment. Alternative

forms of accountability have not been explored or attempted. Therefore, an area for further study is that which addresses alternatives to evaluation, exploring ways in which program and project designers might be accountable to funding agencies, and to their clients, in a variety of ways.

Since a great many themes emerged in the last case study, it seems logical to assume that further use of the approach developed and partially tested in this study would lead to an even larger number of themes. It has already been suggested that further research could be conducted in the areas already mentioned: the questions related to funding, the issues surrounding confidentiality and privacy of patient records, for example, as well as the differentiation and further exploration of the concept of need. As the list of themes and issues grows, new opportunities for research will continue to be presented. With the development of the approach recommended, it will be possible to identify those issues worthy of further study, or explore even further those themes which have already emerged, developing theories which can be tested empirically.

It should also be noted that the approach formulated needs to be tested further, in new situations or in different phases of similar studies, for example, at the stage of project design or at the final assessment stage. The testing of the approach for such studies as those related to documentary surveys, or other exploratory studies in the field of communications research in complex organizations would contribute to the

refinement of this method. It has also been noted in earlier chapters that meta-evaluations are no doubt more useful to the advancement of new knowledge than the repetition of similar studies. The grounded theory method is adaptable to the conduct of comparative studies, and might be tested for comparative studies in the field of health and medical communications research. Finally, databases may be developed as a result of these studies, providing a useful knowledge base for study and research.

Major Conclusions of the Study

The above list of areas for future research are suggested as the main recommendations for on-going study in this field. As well, there are a number of major and minor conclusions which can be drawn from this study. All of them have been introduced and discussed briefly or at length in the course of the six chapters. For example, at the end of the first case study it was concluded that a new approach was needed to examine the introduction of communications technology in the health care field, which presents a rich and complex context for study. Secondly, it was suggested that open-ended methodologies for collecting data might be more appropriate than questionnaires because in-process and open-ended methodologies might allow for the emergence of unplanned effects which new technologies (or innovations) bring. Finally, it was made clear that two entities

should be accounted for: the end user and his/her needs in relation to communications technology.

Through the second case study, where much of what was learned through the historical review of the first case study was applied, it was demonstrated that the end user is often not able to choose what communications improvements (whether technological or human) might fulfill his/her needs. Indeed, often answers to the most open-ended questions in an interview brought forth issues related more to the variety of day-to-day problems encountered, than to the need for specific improvements in communications technologies. It was concluded through this case study, that placing the users needs as the centre of the study was insufficient to guide the implementation of a communications network. Much more needed to be known or understood about the process of implementing communications technologies in the complex context of the health care sector.

It was in the third and last case study that a revised approach for gathering open-ended information previous to formulating a specific research or implementation plan was devised, based on the grounded theory approach. In this approach, theory is discovered, not formulated from assumptions. A large quantity of narrative data was gathered, neccessitating the development of a method for aggregating the data. It was possible to speculate, from the findings of the third study, that the same approach could be used for most phases of a study, from needs survey, to implementation to evaluation. From the

large number of themes which emerged in the final case study, it was possible to demonstrate how the researcher can proceed to conduct further research as new insights are discovered from data.

In looking back over the previous telemedicine projects, the quotation from Wildavsky seems apt: "In large part. . .knowledge is negative. It tells us what we cannot do, where we cannot go. . . . " but also, "Error must be the engine of change." [35]

An important footnote to the entire study is that the approach developed potentially leads the user-as-stakeholder to realize a heightened awareness of the implications and the results (not before appreciated) of introducing telecommunications technology, or perhaps any coordinative technology, in the context of any human endeavor, particularly his own. [36] While such an awareness may not guide the implementer in the choice of an appropriate communications medium, it suggests to the researcher that this approach helps to develop a different level of knowledge, or a new self-consciousness heightened by the presence of new and better questions about say, the role of communications in everyday

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[35] Aaron Wildavsky, Speaking Truth to Power: The Art and Craft of Policy Analysis (Boston: Little, Brown and Co., 1979).

[36] The author distinguishes here between technology which is used for functions not previously done by humans, for example, computer-assisted design and manufacturing, as opposed to functions which have traditionally been done by humans, for example, communications has been oral and face-to-face in most health care situations.

life, and the responsibilities of potential users in using, selecting and disseminating information communicated. But it is no doubt the new awareness of the potential of the communications technology to bring about change– desirable and undesirable– which is of greatest interest. Thus it may be said that involving the respondent-who-will-be-user in the act of choosing a future (by refusing the technology, perhaps, or by increasing his own awareness and level of participation in the choice and design), is to contribute to experiential knowledge in a new way, especially if the respondent-as-user is one who is relatively unaware of the issues prior to his involvement in the process. The grounded theory approach discovers theory from data. In the approach formulated for this study, the respondents, all stakeholders may access the information at any time and may input information into the system, thus contributing to the formulation of newer and better questions to be asked about the implications and the issues.

The philosopher Lonergan (1965), in his treatise on human knowing, described three horizons which limit knowledge. One limits what the subject knows. The second horizon, which is beyond this one, limits what the subject knows that he does not know. There is a third, limitless horizon, which can be said to contain what the subject does not know that he does not know. The method of discovery described in this thesis permits the subject-as-user to push back the horizons simultaneously, enlarging what he knows, what he would like to know, and thereby

encroaching into the sphere of ignorance, and shrinking the horizon which delimits what the subject does not know that he does not know.

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APPENDICES

APPENDIX A

I. Excerpts from Final Report to the Knowledge Network

The Health Care Community

In general, a health care community comprises recipients and providers. Recipients (patients) have care and educational needs. Potential recipients, along with patients, need programs which are aimed at sickness-prevention and health-promotion. Ex-recipients may need to acquire self-care and health promotion or healthy lifestyle skills and knowledge.

The providers of health care services can be divided into three large overlapping categories: those who dispense care (health manpower), those who administer the funding and management of health care, and those who are involved in research and in the theoretical and clinical education of health care professionals.

Included in this last category are all levels of government involved in public health and health care, nationally, provincially, and municipally, even those departments whose primary function relates to health prevention and promotion rather than the direct provision of health care services. Finally, this category necessarily includes all the institutions through which health care and health education are dispensed.

Physician Education

The education of health care professionals is made possible through the cooperation of institutions in two sectors: education and health.

Ideally, the two sectors offer students theoretical knowledge and practical training which, combined together, produce a professional equipped to practice often intricate and difficult skills, make complex decisions, and exert good judgement, under unusual or stressful situations where errors have life or death consequences.

The professional needs to practice a high degree of interpersonal skills. Finally, in order to keep up with his own field or specialty, the professional must be self-motivated and keenly interested in upgrading his knowledge and skills.

There are 16 medical schools in Canada. In terms of the number of students, as of September 1984, UBC will be the third largest. The length, location and type of education which students undertake follows a pattern of didactic and clinical training, as follows:

medical school (4 years) + internship (1 year) + residency (specialty training, 4 years)

The medical school offers basic sciences followed by clinical and applied sciences, and takes place typically in a university setting with teaching hospitals. At the undergraduate level, programs are accredited by a committee of the Association

of Canadian Medical Colleges. Interns, with the assistance of the Canadian Intern Matching Service (CIMS), generally serve their internship in a location remote from their medical school.

The residency and specialty training is usually 4 years in length. There are 47 post M.D. specialties available in Canadian medical schools. Of these, 33 are offered through the UBC faculty of medicine, and its teaching hospitals. The specialty programs are approved by the Royal College of Physicians and Surgeons, who accredit the programs once per 5 years.

There are 410 interns and residents in BC altogether. Of these 75 only are interns in first year, and only 1/3 of these are first year interns who are UBC-educated. [1] Interns do not necessarily come under the jurisdiction of the university; they are under the jurisdiction of the hospital, but they participate in most of the learning activities provided at that hospital.

It is generally recognized that physicians have special continuing education needs, because (1) they must keep up with a very broad array of skills which they do not necessarily utilize daily, and (2) they must keep abreast of new developments and current practice in medicine generally - as well as in their own specialty. Physicians located in remote areas often find it difficult to remain current. [2]

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[1] Medical students are encouraged to seek internship training elsewhere to get a broad view of the practice of medicine.

[2] BC has the highest number of registry-active physicians per capita, but most are concentrated in the urban area. Considering the vast distances in BC, physicians in remote areas are truly

Medical schools and professional associations usually cooperate to provide avenues for continuing medical education (CME). Ministries of health often provide for tax benefits and funds on a per capita basis, for each practicing physician. Physicians use the funds to attend conferences or take courses for credit. For example, credit is provided through the Association of Family Physicians. CME courses on the Network are recognized for credit by the family physicians.

Some physicians from selected professionals associations were interviewed, along with a number of officials and faculty members of the medical school (UBC). From these interviews, many needs for both the cable and satellite delivery systems emerged. Refer to the sections entitled Cable Uses and Satellite Uses, on the following page.

Nursing Education

There are several levels of nursing programs in BC.

The basic RN program is offered at 8 colleges and institutes, in cooperation with participating hospitals. One program is totally hospital based. The University of BC offers a Baccalaureate program (BSN).

Innovative nursing programs include the outreach program being prepared at UBC for those nurses who are practicing and who would like to upgrade their RN to a baccalaureate degree.

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[2](cont'd) isolated.

Post-graduate programs are offered at both the Universities of Victoria and at UBC. UBC also offers a masters degree in nursing. A wide range of specialty programs are now springing up to meet new skill needs of emerging specialty areas: critical care and gerontology, for instance.

There are some 27,000 nurses registered with RNABC. [3] In the view of some of the interviewees, nurses in BC are facing some critical problems which may only be partially solved through the process of continuing education. One of the problems is simply the rapid turnover of staff: that is, new nursing graduates often leave the nursing field very soon after entering.

A second problem identified by interviewees from the nursing field relates to the number and complexity of health care issues which nurses face currently, and which require reflection, discussion and careful study. Many practicing nurses are remote and cannot often meet with their counterparts to discuss and help solve some of the emerging health care practice issues.

One interviewee suggested that the rapid introduction of new technology into the health care field was creating requirements for new nursing skills.

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[3] Reference, Registered Nurses Association of British Columbia, Vancouver.

These problems and issues have led nurse-interviewees to make a number of suggestions for utilization of the cable and the satellite network. These are listed on the next page. By and large, nurses remain committed to the ideal of providing distance education to students who cannot come to an urban area for courses, or attend classes on a regular basis, while working. The problems due to shift work, fatigue, and the need to combine knowledge acquisition with relevant clinical experiences presents special challenges to nursing continuing education, especially if relevant clinical experiences are not available in their locale.

Other Health Professional Education

Most health professional education is offered conjointly between hospitals and colleges or institutes. Such programs may follow national standards and be accredited. Other programs are more ad hoc and innovative. Universities also offer a variety of health administrative, biomedical, health information and health planning programs, certificates and degrees.

Tne British Columbia Institute of Technology offers the widest range of health technology programs of any post-secondary institution in BC. Most graduates are subject to national examination and most programs are accredited by a national group. Students spend a significant portion of their program in a clinical setting. It is often at the end of this clinical

period of training that those students must write didactic examinations, and hence they have needs during their clinical training for specialized instruction which is not always available in the hospital.

Health technologists also have special continuing education needs for many of them are required to adapt to challenging and rapid technological change.

Health, like education, is a provincial matter. Despite increasing interest in telecommunications applications for health, Ontario is still the only province which has officially established a telehealth office within its ministry of health.

The Knowledge Network, at the time of the study, presented a unique mix of technologies. It was also institutionally separate from the groups or agencies which used its services, permitting it to remain separate from institutional barriers. Most health care telecommunication projects (e.g., Newfoundland) had their genesis in a faculty of medicine or a health institution.

Health Programs on the Network

The Network's involvement in health programs, prior to the study, had been confined to offering courses on satellite in the public service category. There were 3 levels of programming:

1. University programming - for credit or noncredit;
2. Courses offered by colleges and institutes; and

3. General interest or teleseries courses for the general public.

A wide variety of needs and wishes were listed by respondents and many of these were identified to Network officials in the course of the study.

The study also attempted to identify where Network course offerings needed to be increased in the health subjects, and where programs needed to be implemented to meet existing needs. A disproportionate amount of university-level programs (in terms of hours) were identified, as compared to college-level programs. Relatively few health and medicine-related university programs exist at the 3 universities. By contast, a total of 82 programs were offered in 18 colleges and institutes in health technology and in allied health or para-professional level programs. Many post-graduate and refresher course needs were identified. Public health officials who were interviewed expressed needs for more public health programs, health information, health promotion and maintenance courses and general interest courses on health subjects for shut-ins, senior citizens, and the handicapped.

The increased interest in university course offerings may be due to increasing efforts to decentralize teaching. A recent accreditation report to the medical school suggested that certain changes in the curriculum be introduced. The curriculum committee prepared a brief document which outlines some proposed

changes to both content and style of course delivery. [4] Changes proposed include reducing the number of lectures and replacing them by "more interactive and varied instructional experiences." Interest was expressed in the implementation of directed independant study using self-learning materials and techniques.

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[4] "Report of the Curriculum Planning Committee on Proposed Curriculum Revisions," November 1981. Unpublished.

II. Identified Uses for Network Services

Satellite Uses

The following needs for satellite programs were identified:

- programs which explore using different technological combinations, for example, teleconferencing and video, or teleconferencing and videotex;
- more teleseries programs on the general theme of health prevention and health promotion; such programs must be of very high quality to capture the imagination, and to successfully compete with a host of other very high quality programs offered;
- programs for groups who need upgrading, recertification, or new skills. A typical program which can be public or not, is the recertification program planned by Emergency Health Services.
- health technology programs are needed to upgrade health professionals working in remote areas, who can no longer obtain funds for travel to meetings, conferences and courses.

- Video documentaries and programs for physicians, for whom interaction is severely hampered by the open line which allows for public viewing of CME programs, e.g.
- Teleconferencing: a number of professional associations mentioned this need - for uses inside and outside BC - but few are in a position to underwrite the costs of video teleconferencing. However, since there is a need by a number of professional associations to cut travel costs and yet to obtain from their membership, the support and the dialogue necessary for fair representation on issues, alternatives ought to be considered, such as a technology mix of video and audio conferencing. Some professional organizations mentioned a problem of information timeliness when trying to reach a large widely dispersed constituency. A newscast beamed at regular intervals would probably be an effective and timely substitute for the printed page.
- Some health care providers identified a need for courses beyond the regular CME course offerings for physicians located in remote areas.

While teleseries courses can be live or pre-broadcast, a number of methods can be explored which will allow the program recipients to participate more freely in learning activities, for example, a public health program (in Chilliwack) which provided for a panel of local experts who could answer questions

locally, following a Knowledge network program.

Cable Uses

The following uses were identified for the interinstitutional cable:

Video Uses

- A number of interviewees mentioned that the cable should be used to beam rounds,
- The need mentioned most often is that of the medical school; there is a need for sending some of the clinical science lectures and some basic science programs over the cable to permit more effective use of student and faculty time; and save on travelling from one site to another.
- Another need mentioned quite often is that of meetings, as in teleconferencing, using the cable to transmit.
- There is a need to share in special events such as a visiting lecturer who can only lecture once from one site.
- There are a number of needs related to health technology such as continuing education, because BCIT can probably offer a number of courses over the cable to technologists who are employed in teaching hospitals.
- Several mentions were made of a possible call-up service for

video tapes for patient education as well as for medical students.

- This need for self-instructional activities to be delivered over cable will increase with increasing changes in the medical school curriculum, allowing for greater reliance on self-instruction.

Data Uses

The following needs were identified for transmission of data:

- linking of computers for a variety of purposes, including ready access to patient information from one facility to another; laboratory management; inventory; and research.
- BCIT's nuclear medicine and radiography students are are obtaining a computer so that they may learn to use it under simulated conditions (i.e., link BCIT and one or more teaching hospitals- the Vancouver General).

Other

- In each of the teaching hospitals, a number of grand rounds take place every day - the Knowledge Network may be advised to obtain a video text system which would allow for the simultaneous beaming of lists of rounds, providing a real service to visiting students and professors, and to hospital

staff.

- A number of futuristic data uses for the cable emerged: the linking of microcomputers, in participating hospitals the use of microcomputers for self-learning through computer-assisted instruction, as planned for the medical school;
- Other uses mentioned: library, the automation of patient records, such as is provided by the Health Medical Records Institute.

III. Some Problems

In the course of conducting the research for this study, and in the process of interviewing, the following issues, problems and concerns emerged.

Terminology

A certain amount of confusion with reference to existing terminology which describes the networks systems was encountered when interviewing and overviewing publications. Terms were used interchangeably: restricted and closed circuit public and open, second service and scrambled service, broker and carrier.

Network Publicity

The publicity and information about the Network's activities have concentrated on a popular marketing strategy which has attracted the large viewership the Network enjoys. The needs of the health care community are for more information about the Network's technology and communication capability. This reflects an increasing need, in the BC health care sector, for demystifying the technologies for information processing and communications.

Confidentiality

In The Physician and Canadian Law , Marshall quotes from R. v Hawke:

> "...If private telephone conversations are to be protected from electronic eavesdropping, how much more important is it to protect the confidential communications between a doctor and patient, whether that patient seeks assistance voluntarily or has the relationship thrust upon him by involuntary admission procedures when he is placed in hospital? The doctor to whom he speaks has taken an oath of secrecy based on concepts older than our common law. He is responsible in damages if he violates that relationship. Everyone recognizes that confidentiality is essential to diagnosis and therapy. Indeed, one may go further and say public health is involved if those requiring assistance refrain from seeking it for fear it will be disclosed...."[5]

The issue of confidentiality has crept into correspondence, proceedings, and interviews. A total of 9 remarks were made on this subject by interviewees.

Some confusion exists regarding confidentiality of patient records.

One Canadian authority on medicolegal matters is generally considered to be Lorne Rozovsky. Rozovsky says:

> "...the patient does have the right to have his record kept secret and confidential. There have been few judicial decisions in either Canada or England but there is some legal basis for taking this view. The right would be in the form of an implied contract between the institution and the patient to maintain confidentiality.[6]

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[5] T. David Marshall, The Physician and Canadian Law, 2nd ed. (Toronto: Carswell Co. Ltd., 1979), p. 74.

[6] Lorne E. Rozovsky, Canadian Hospital Law 2nd ed. (Ottawa: Canadian Hospital Association, 1979), p. 96.

He then goes on to list 3 exceptions: a court order, a provincial statute, or a matter of public policy.

In some cases the ownership of the patient's record becomes an issue. The law is clear on record ownership. The doctor, the hospital or the clinic owns the record. But it is unclear except in the case of research, under what circumstances the patient's image and voice can be used, and under exactly what circumstances the consent is valid. [7]

A special consent form is usually required by most institutions for photography and video, even when these are used for teaching and research. It is not certain that this form is legally adequate; many feel it is not. One respondent, a physician, said "we will only know if we get sued." Because the confidentiality issue is one which has become more important in the press the network would be well advised to seek legal advice or at least obtain input from a recognized medico-legal expert.

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[7] A longstanding tradition exists in medicine to keep the patient's identity a secret whenever the case is discussed in rounds, for example. This grew out of the Hippocrates' Oath which states in part: "Whatsoever I shall see or hear in the course of my profession. . . if it be what should not be published abroad, I will never divulge, holding such things to be held secrets...."

Costs and Fees

The subject of costs and fees came up several times in interviews. Correspondence has already been generated between teaching hospitals and UBC which suggests what fees would be established for each participating institution. A number of models for establishing fee structures present themselves, for example:

- AN INSTITUTIONAL FEE:

  A flat fee is charged to each institution regardless of content, facilities or traffic. In the absence of polling devices, this is probably the easiest route to follow, especially if the Network opts for dealing with groups of institutions through a broker or agent such as UBC Biomedical Communications.

- A CHANNEL FEE:

  A channel is leased to an institution or subscriber or agent and a flat fee for a full channel is charged. In practice, because of switching locations at UBC and the Knowledge Network, this may be the same as applying an institutional fee.

- SHARED SUBSIDY:

  Total costs are shared between subscribers regardless of estimated use and/or benefit expected. This model is already being applied at UBC for certain shared services; for example, the library, and the services of UBC Biomedical

Communications.

- SUBSCRIBER FEES:

  Institutions and individuals can subscribe to a package of services and pay a nominal fee plus a user fee based on the amount of time they wish to use the service. Technically this is difficult to apply in the absence of a computer to poll usage. [8]

- PREFERRED SERVICE FEE:

  This method is similar to data services purchased in the private sector. The subscriber pays for only those services he plans to use. In practice, this may become necessary when those institutions join the Network who have receive-only capabilities, for example.

Two Approaches to Production and Programming

Two approaches to programming have emerged in the course of interviewing for this study. The two schools of thought can be summarized as follows

- The centralized approach to production

  In this approach there is a strong emphasis on high quality studio production with less thought being given to user convenience. The stress is on broadcast quality. The user is

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[8] This route might be considered in the future for private nonpublic users.

a programmer and is expected to adapt to the medium. Energy and resources are devoted to production.

- The decentralized approach

  This approach is characterized by user convenience. Some energy is devoted to decentralizing hardware to make it easy to use. Users are encouraged to use the system, and may not be required to go to a studio.

In general, members of the UBC health science faculties and schools foster a decentralized user-driven approach to production. This approach has been encouraged successfully by UBC Biomedical Communications and is a product of their department's policy of decentralization which has found easy acceptance amongst users.

In setting up an initial test for cable use in the fall of 1982, this user-driven approach was not successful, partly because inadequate lead time for preparation was available. After some readjustments, however, the lecturers and programmers feel confident these problems can be overcome in future trials.

The Network's systems are sufficiently varied to accommodate both the centralized and decentralized approaches to production. For the sending of images to closed user groups (for example, on closed circuit cable) there are several advantages to allowing the participating institutions to choose the level of production quality they need for their own purposes. The broker (in this case, UBC Biomedical Communications) should be permitted to choose the route best suited to the user group,

providing technical specifications of the Network are met.

However, the Network cannot completely ignore its responsibility as carrier, especially in reference to the public service aspect of its programming. The resource the Network manages is not unlimited, and can indeed be considered a scarce commodity. Hence, the Network might require public service applicants to be responsible for ongoing evaluation and quality, and for some commitment to improvement of programming, as needed.

A significant number of interviewees, particularly potential users, were concerned about broadcast quality of satellite programs. It was mentioned several times that there is a need for high quality productions if one is to compete with other messages on the media. Yet, strong emphasis on high quality materials was felt by some interviewees to reflect an elitist approach, effectively preventing some users from being able to use the medium (for they could not afford the resources necessary to produce high quality materials).

The Network can probably accommodate users in both categories: centralized high-quality producers, and decentralized user-driven producers. Increased quality for the public service is not incompatible with a user-driven approach, but a dual responsibility is created. In asking for better quality, the Network must provide adequate routes to expert technical and content advice.

Scheduling for a Democratic Network

The closed circuit cable can be compared to a network. In a democratic network, equal participation is the ideal. To be effectively equal, a number of human and technical factors must be considered. First, the problem of equal access- made easier if all participants have equal technological capability. Equality of access is also made easier if the participant is able to make his requirements known relatively easily.

Second, there is the problem of scheduling. It is conceivable that all requests for time may happen in the same time-slots. To accommodate multiple requests for routes and switching requirements, the network must gradually move towards automated switching and scheduling. Without a computer-driven system, much of the cable's capacity will be unused.

Allocating Channel Space

A guiding principle under which the Network has operated so far has been to maintain a separation between its carrier services and the content produced by programmers who use the Network. Working with user committees, such as the Learning Systems Working Group, the Network attempts to facilitate programming for user-groups but does not materially influence content. The model is that often referred to as content carriage separation.

To maintain this principle in allocating space on cable, the Network cannot operationally act in the same way for a cable service is a communication link and not a telecasting service. The essential difference lies in the fact that a communication link, like a telephone, need not require elaborate preparation for use.

The survey of those who have potential uses for the closed circuit cable reveals a broad spectrum of needs and potential programmers. There is ample evidence of both need and enthusiasm. Needs fall under umbrellas for undergraduate education, graduate education, administration (meetings) special events programming, and diagnostic image transfer, as well as data uses.

As there is some confusion about the respective roles the Knowledge Network and UBC Biomedical Communications are to play in apportioning responsibilities, the UBC health community—especially participating hospitals who will use the cable—should be informed of the roles and relationships. Several interviewees indicated an interest in assisting the Network in this regard. Since a very large number of committees already exist, all competing for time and attention, the Network might consider forming a resource group which could meet either electronically or by conference telephone.

In Conclusion

An Acceptable Policy Direction

Increased involvement in health matters will multiply the number and variety of stakeholders competing for Network time. It will be difficult with existing resources for the Network to make appropriate choices because of the multiplicity of demands. Additional human and hardware resources will be needed over the long term to cope with the demands, but, as well, it is suggested that the Network adopt a policy which will help sort out the requests and the competing demands. Such a policy would embody a number of overlapping elements and reflect those existing Network principles which have provided for productive utilization of Network services in the past. It is suggested that the main elements of the policy embody a public utility concept, including an emphasis on health programming, requiring a balance in allocation of program time, especially on the public service network.

The Network is a public utility in the sense that it is responsible for managing a publicly owned resource. The principle of the greater good can therefore be applied. An appropriate testing ground for the application of the public utility concept is found in health programming. As a practice example, programs aimed at the promotion of health and the

prevention of illness might take precedence over programs which portray unhealthy lifestyles. [9]

Adopting a content-carriage separation policy will not shield the Network from competing paradigms such as the health/medical paradigm. The Network may be confronted from time to time with difficult program choices, and should therefore establish ways and means for obtaining appropriate advice about content. Alternatively, the Network may choose to make the programmer responsible for obtaining the advice.

In general, a balance of programming needs to exist to make available a multiplicity of program content. This balance of programming may also permit the resource poor to compete successfully for Network time. As noted above, some mechanism needs to be established to allow for this balance of programming content.

A final element of the overall plan calls for the Network to consider adopting long-term objectives, and make long range planning one of its priorities. This suggestion emerged from a number of interviews.

In summary, the overall framework identifies the Network as a public utility. As such a balance of programming is to be encouraged. The principle of the common good when applied to Network programming can operate even though in practice, there is a separation of content from the carrier technologies.

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[9] Over medicalization as well as unhealthy lifestyles can both contribute to reduced health and increased health care costs.

APPENDIX B

I. Themes

Introduction

Following is a list of the fifty-five (55) themes which were identified in the course of the interviews conducted. Themes identified with an asterisk (*) have been selected for demonstration of the method used for coding and listing the themes in each of the interview transcripts and notes.

For purposes of this study, a transcript refers to an actual record of the interview. These records were obtained using a tape recorder during the interview, and transfering the interview directly into a computer text processing file following the meeting. Interview notes, on the other hand, were obtained by reconstructing notes taken during the interview. These notes, initially recorded by hand, in point or abridged form, were subsequently written in paragraph form, and entered into the text processing file as narrative, as soon after the interview as possible, usually on the same day.

Following this list of the themes, then, two separate listings have been produced to identify (1) the occurrence as well as (2) the location of each of the themes, within the interview notes or transcripts. Since the interview notes and transcripts have been stored in a single computer text file, the

occurrence of the themes is indicated using line numbers for easy reference.

Themes*

The following themes were selected for a demonstration of the method used for coding, listing and locating.

*Advisory Councils and Committees

*Air Time

*Changes in Medical Curriculum

*CAI, Self-Instruction

*Educational Needs

*Existing Concerns, General

*Funding the System

*Future Cable Needs - Educational

*Future Cable Needs - Medical Rounds

*Future Concerns, Costs

*Future Concerns, General

*Future Needs, Administrative

*Future Needs, General Comments

*Future Needs, Scrambled service

*Possible Topics for Programs

*Production Quality

*Travel Substitution

The following themes are not shown in the list but were identified as predominant themes emerging in the interview transcripts and notes.

Application Procedures

Need for Data Communications

Medical Diagnoses

Policy Formulation

Special Events

Future Needs, Cable Only

Future Cable Needs - Administrative

Future Cable Needs - Data

Future Cable Needs - Clinical Service

Future Satellite Uses

Future Satellite Uses, Administrative

Future Satellite Uses, Educational

Future Needs, Other

Future Needs, Scheduling

Needs Beyond B.C. Borders

Electronic Needs

Public Education

Patient Education

Existing Concerns re: Costs

Existing Concerns re: Interaction

Existing Concerns re: Program Design

Existing Concerns re: Confidentiality

Technical Concerns

Publicity

Concern re: Inadequate Input

Future Concerns: Confidentiality

Future Concern: Need for System

Future Concern: Caseload

Ownership and Control

Time-Saving

Aid to Remote Areas

Residency/Internship Programs

Evaluation

Health/Medical Paradigm

Nursing

Teleconferencing

Technological Mix

Biomedical Communications

The following listing indicates the location, within each coded interview transcript or record, of the identified theme. Note each interviewee is identified by a code (such as '100ih') to maintain the confidentiality of the interviewee's comments. Each theme has been classified for content using a simple 3-point nominal rating: F for favorable; U for unfavorable, and N for neutral. This categorizing was done to aid in the grouping of the interview material, and indicates that, in the opinion of the researcher, the remark indicated that the interviewee was speaking favorably, unfavorably, or neutrally about this particular topic or theme.

THEME		Code	Line	Range
Advisory Councils and Committees	F	6501wm	841	851
Advisory Councils and Committees	F	3500G	3397	3405
Advisory Councils and Committees	N	2003fd	511	516
Advisory Councils and Committees	N	2500kw	3928	3934
Advisory Councils and Committees	N	4507LM	1674	1690
Advisory Councils and Committees	N	8002bl	6023	6027
Advisory Councils and Committees	N	2011c	3206	3211
Advisory Councils and Committees	N	2500kw	3911	3925
Advisory Councils and Committees	N	4507LM	1627	1648
Advisory Councils and Committees	N	3500G	3413	3419
Advisory Councils and Committees	N	3500G	3377	3392
Advisory Councils and Committees	N	2013D	4129	4134
Air Time	N	1006AM	73	85
Air Time	N	4001if	1508	1519
Air Time	N	4006dl	2387	2399
Changes in Medical Curriculum	N	2003fd	528	549
Changes in Medical Curriculum	N	2019rl	6661	6692
Changes in Medical Curriculum	N	1001h	1038	1048
Changes in Medical Curriculum	U	2003fd	560	571
Changes in Medical Curriculum	U	4004gp	2102	2113
Changes in Medical Curriculum	U	2003fd	572	582
Changes in Medical Curriculum	U	2012B	860	865
CAI, self instruction	F	2019rl	6748	6765
CAI, self-instruction	F	2011c	3213	3242
CAI, self-instruction	F	2014ac	6450	6463
CAI, self-instruction	F	2503jm	2485	2489
CAI, Self-Instruction	F	5003DP	420	426
CAI, Self-Instruction	U	2003fd	583	597
Educational Needs	F	7005R	4463	4475
Educational Needs	F	4503dw	1796	1802
Educational Needs	F	2014ac	6596	6605
Educational Needs	F	7004B	3679	3683
Educational Needs	F	7500SN	4914	4919
Educational Needs	F	1001h	996	1005
Educational Needs	F	2014ac	6414	6422
Educational Needs	F	7003c	3056	3065
Educational Needs	F	1004dr	1090	1096
Educational Needs	F	7003c	3086	3095
Educational Needs	F	1004dr	1056	1068
Educational Needs	N	7503tw	5225	5247
Educational Needs	N	6501wm	852	855
Educational Needs	N	7503tw	5437	5450
Educational Needs	N	1001h	954	964
Educational Needs	N	7500SN	4765	4790
Educational Needs	U	7001B	2569	2574
Educational Needs	U	8002mw	4334	4338
Existing Concerns, General	N	5002mh	167	175
Existing Concerns, General	N	1001h	969	976
Existing Concerns, General	U	5001FC	386	390
Existing Concerns, General	U	2019rl	6632	6659
Existing Concerns, General	U	9003gz	700	711

Existing Concerns, General	U	2002F	3664	3669
Existing Concerns, General	U	7503tw	5359	5365
Existing Concerns, General	U	4506jm	1587	1593
Existing Concerns, General	U	8003km	5616	5635
Existing Concerns, General	U	4053bg	2193	2209
Existing Concerns, General	U	5004dk	4150	4163
Existing Concerns, General	U	9003gz	788	793
Existing Concerns, General	U	2014ac	6423	6441
Existing Concerns, General	U	4004gp	2088	2095
Existing Concerns, General	U	8004R	4953	4976
Existing Concerns, General	U	6501wm	827	840
Existing Concerns, General	U	6003ah	5582	5591
Existing Concerns, General	U	4005sb	2254	2267
Existing Concerns, General	U	2014ac	6562	6582
Existing Concerns, General	U	6004pw	5956	5962
Existing Concerns, General	U	8003km	5602	5611
Funding the System	F	1001h	1032	1037
Funding the System	F	2019rl	6790	6798
Funding the System	F	4003bg	2188	2192
Funding the System	F	2012B	912	923
Funding the System	N	6001TG	3728	3733
Funding the System	N	4502ic	1268	1273
Funding the System	N	3500G	3406	3409
Funding the System	N	1001h	1021	1026
Funding the System	N	3500G	3423	3429
Funding the System	N	4502ic	1315	1321
Funding the System	N	1004dr	1078	1080
Funding the System	U	8004R	5001	5010
Funding the System	U	4005sb	2320	2330
Funding the System	U	9003gz	731	746
Future Cable Needs - Educational	F	2502aj	20	43
Future Cable Needs - Educational	F	5009jl	4253	4261
Future Cable Needs - Educational	F	4002br	2032	2040
Future Cable Needs - Educational	N	6004pw	5924	5944
Future Cable Needs - Educational	N	2012B	893	902
Future Cable Needs - Educational	U	2009wm	485	491
Future Cable Needs - Educational	U	2500kw	3861	3871
Future Cable Needs - Educational	U	2503jm	2495	2505
Future Cable Needs - Educational	U	2008pc	1716	1723
Future Cable Needs - Educational	U	2012B	875	885
Future Cable Needs - Educational	U	4503dw	1837	845
Future Cable Needs Med Rounds	F	2009wm	494	501
Future Cable Needs Med Rounds	F	2010AG	3126	3137
Future Cable Needs Med Rounds	F	1001h	1006	1017
Future Cable Needs Med Rounds	F	4003bg	2144	2152
Future Cable Needs Med Rounds	F	2008pc	1701	1708
Future Cable Needs Med Rounds	F	2002F	3634	3658
Future Cable Needs Med Rounds	F	2012B	866	874
Future Cable Needs Med Rounds	F	4005sb	2340	2347
Future Cable Needs Med Rounds	F	4504ef	1898	1901
Future Cable Needs Med Rounds	U	2015JR	308	319
Future Concerns, Costs	N	7001B	2599	2611
Future Concerns, Costs	N	2502AJ	59	66

Future Concerns, Costs	U	7005R	4683	4690
Future Concerns, Costs	U	7001B	2615	2624
Future Concerns, Costs	U	7500SN	4920	4932
Future Concerns, General	F	2010AG	3199	3203
Future Concerns, General	N	2010AG	3110	3124
Future Concerns, General	U	8002mw	4339	4350
Future Concerns, General	U	9003gz	716	730
Future Concerns, General	U	8002mw	4300	4309
Future Concerns, General	U	4002br	2047	2052
Future Concerns, General	U	8002mw	4320	4328
Future Concerns, General	U	2503jm	2515	2524
Future Concerns, General	U	4005sb	2283	2308
Future Needs, Administrative	F	2014ac	6545	6557
Future Needs, Administrative	F	2010AG	3154	3159
Future Needs, Administrative	F	7005R	4533	4554
Future Needs, General Comments	F	5002mh	110	121
Future Needs, General Comments	F	2013D	4065	4083
Future Needs, General Comments	F	7005R	4455	4462
Future Needs, General Comments	N	1002kf	1216	1234
Future Needs, General Comments	N	7005R	4520	4532
Future Needs, General Comments	N	2011c	3282	3291
Future Needs, General Comments	N	1001h	987	995
Future Needs, General Comments	U	2015JR	328	338
Future Needs, Scrambled Service	F	7005R	4476	4488
Future Needs, Scrambled Service	F	1005gm	1169	1173
Future Needs, Scrambled Service	F	9003gz	757	774
Future Needs, Scrambled Service	F	1004dr	1097	1107
Possible Topics for Program	F	5009jl	4233	4248
Possible Topics for Programs	F	5002mh	158	166
Possible Topics for Programs	F	7001B	2556	2567
Possible Topics for Programs	F	5003DP	408	419
Possible Topics for Programs	F	6004pw	5945	5955
Possible Topics for Programs	F	2012B	924	929
Possible Topics for Programs	F	5004DK	4169	4179
Possible Topics for Programs	F	7003c	2999	3003
Possible Topics for Programs	F	2010Ag	3138	3147
Possible Topics for Programs	N	5002mh	179	183
Possible Topics for Programs	N	7503tw	5323	5340
Possible Topics for Programs	N	6000p	1736	1748
Possible Topics for Programs	N	7500SN	4823	4832
Possible Topics for Programs	N	7004B	3695	3700
Possible Topics for Programs	N	9003gz	775	786
Possible Topics for Programs	N	7001B	2666	2684
Possible Topics for Programs	N	4501d	1436	1446
Possible Topics for Programs	N	6000p	1764	1771
Production Quality	F	4504ef	1963	1974
Production Quality	F	4001if	1520	1524
Production Quality	F	4503sb	2367	2371
Production Quality	N	10006A	90	94
Production Quality	N	7503tw	5413	5424
Production Quality	N	4501d	1390	1413
Production Quality	N	4504ef	1917	1925
Production Quality	N	4506jm	1594	1612

Production Quality	U	2003fd	517	527
Production Quality	U	7504jw	6330	6340
Production Quality	U	1008rh	1145	1155
Travel Substitution	F	2015JR	277	291
Travel Substitution	F	2019rl	6618	6629
Travel Substitution	F	2003fd	551	559
Travel Substitution	F	2002F	3582	3593
Travel Substitution	F	5002mh	145	157
Travel Substitution	F	4502ic	1255	1265
Travel Substitution	F	4003bg	2162	2165
Travel Substitution	F	7003c	2973	
Travel Substitution	F	4004gp	2077	2084
Travel Substitution	F	4504ef	1902	1906
Travel Substitution	N	4501d	1364	1370
Travel Substitution	U	2015JR	292	304
Travel Substitution	U	7001B	2656	2665

The following shows the total number of references to the pre-selected themes*, classified according to their content, as 'favorable' (F), 'unfavorable' (U), or 'neutral' (N).

Advisory Councils and Committees	F	2
Advisory Councils and Committees	N	10
Air Time	N	3
Changes in Medical Curriculum	N	3
Changes in Medical Curriculum	U	4
CAI, Self-instruction	F	5
CAI, Self-Instruction	U	1
Educational Needs	F	11
Educational Needs	N	5
Educational Needs	U	2
Existing Concerns, General	N	2
Existing Concerns, General	U	19
Funding the System	F	4
Funding the System	N	7
Funding the System	U	3
Future Cable Needs - Educational	F	3
Future Cable Needs - Educational	N	2
Future Cable Needs - Educational	U	6
Future Cable Needs: Medical Rounds	F	9
Future Cable Needs: Medical Rounds	U	1
Future Concerns, Costs	N	2

Future Concerns, Costs	U	3
Future Concerns, General	F	1
Future Concerns, General	N	1
Future Concerns, General	U	7
Future Needs, Administrative	F	3
Future Needs, General Comments	F	3
Future Needs, General Comments	N	4
Future Needs, General Comments	U	1
Future Needs, Scrambled Service	F	4
Possible Topics for Programs	F	8
Possible Topics for Programs	N	9
Production Quality	F	3
Production Quality	N	5
Production Quality	U	3
Travel Substitution	F	9
Travel Substitution	N	1
Travel Substitution	U	2

The following table summarizes the classifications and the number of references for each of the above-named themes.

THEME	NUMBER of COMMENTS			
	F	U	N	T
Advisory Councils and Committees	2	0	10	12
Air Time	0	0	3	3
Changes in Medical Curriculum	0	4	3	7
CAI, Self-instruction	5	1	0	6
Educational Needs	10	2	5	17
Existing Concerns, General	0	19	2	21
Funding the System	4	3	7	14
Future Cable Needs - Educational	3	6	2	11
Future Cable Needs: Med. Rounds	9	1	0	10
Future Concerns, Costs	0	3	2	5
Future Concerns, General	0	7	1	8
Future Needs, Administrative	3	0	0	3
Future Needs, General Comments	3	1	4	8
Future Needs, Scrambled Service	4	0	0	4
Possible Topics for Programs	8	0	9	17
Production Quality	3	3	5	11
Travel Substitution	9	2	1	12

II. Interviewee Comments

The following comments are drawn from interview transcripts and notes, and are presented here as an example of the way in which specific information (in this case, interviewee comments) can be labelled and grouped together for easy reference. Labelling, searching and printing out the actual interviewee comments was made possible using a text processing computer program. This method of accessing the data permits the reader/researcher to refer to the information in the context in which it emerged, was discovered, gathered and subsequently documented. This technique of organizing recorded information is particularly suited to qualitative studies, for it allows the researcher unlimited scope in the data gathering process, and is a powerful aid in preparing the stage for analysis.

The comments shown below were labelled with the theme Funding the System and they are presented here as an illustration of the method used to organize the information under separate theme headings. They reflect the remarks of some of the respondents who were interviewed in the third case study. For purposes of this study, the comments were categorized as favorable, unfavorable or neutral. Any other system of categorization may be used by the researcher, as a technique for grouping similar information.

In the computer file which contains the interview transcripts, each one of the records is individually identified by a code to indicate which category of interviewee (e.g., physician, university official, nurse) and which individual in the category made the comment. To protect the confidentiality of the interview, the interviewee's name and code have been masked in the listing shown below.

Theme: Funding the System

Favorable Comments

He thinks an institutional fee for courses is more feasible than an individual fee, because the institution can provide taperecording facilities.

As for the funding, it has to be in house by both university and the institution. Because once you have the cable in, the institution has an advantage in using it because it can use it for things that are not related to teaching. For example inservice education, which may not involve medical education at all.

The ministry hoped capital expenditures would be reduced when cable was introduced since some portion of teaching could be done this way, rather than in large classrooms, auditoria and

so on.

He then talked about a fee schedule. This had created a problem in other provinces. An example: a fee schedule for a chest x-ray is as follows:
tech fee 17.85 + prof fee 6.25 = 24.10 the total which the government pays. He thought that the radiologist should still get the professional fee. However, the network should provide the service through extra ministry of health subsidies.

Unfavorable Comments

She does not think that the money for such small group help should come from k n. Rather, k n can possibly be influential in finding the ways to provide experiences for these smaller groups to participate as fully as they can in the network, even though they do not now possess the expertise nor the funds to do so. She does not think that workshops would help.

She talked about how the nurses had a large grant to develop their program, and they also had access to the studios of ubc biomedical comns. As well, individual faculty members in h sc at ubc are given ~~x~~ $ per year for graphics, a-v materials, etc.

Another of her concerns is that the programs are costing them more and more to produce. If only people watching are those

who register for the courses, this will increase the amount of revenue, but she feels that programs are watched by many people who did not register for the course. The only incentive to register is to get the complete course syllabus, the assignments, and the certificate.

For instance, what is this going to cost? Other areas of development have to go hand in hand with k network developments. I know how hard it is to get funding. I tried to get private funds for support of some programs and I was told to invest the money in endowment and use the interest only. I then realized that my fund-raising tactics had to change.

Neutral Comments

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kn is funded by Min of Univ Sc and Comns.

He described the per-person allocation in each hospital, to permit every department to have funds to develop materials for lectures, publications, etc. This charge-back process is controlled by the supervisor.

But in settling the fine line between service and education, one has to arrive at a decision re: charge backs: that is, what department or function will pay for the network's services. This is an urgent problem.

He also mentioned the Key report. This is a report which described health and education as separate within teaching hospitals (for funding purposes).

He has asked how his hospital can be linked -it does not now have a cable. He admits to not knowing where the line is to be drawn from the financial point of view. What is K N's responsibility visa vis the costs of using the network. . . .

The council wanted feedback from the committee re: financial resources needed if the cable were to be used.

He described the small module concept. This new program needs funding. They will find funding in the private sector by selling industry courses developed appropriately just for them.
