# STUDY ON THE ECONOMIC, POLICY AND INSTITUTIONAL ISSUES INFLUENCING THE USE OF SATELLITE BASED TELECOMMUNICATION FACILITIES FOR PUBLIC SERVICES

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# A STUDY OF THE ECONOMIC, POLICY AND INSTITUTIONAL ISSUES INFLUENCING THE USE OF SATELLITE BASED TELECOMMUNICATION FACILITIES FOR PUBLIC SERVICES



## FINAL REPORT

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## EXECUTIVE SUMMARY

This report, prepared in compliance with contract No. OSU78-00218 of the Ministry of Supply and Services for the Ministry of Communications: Ottawa, deals with the following five objectives.

1. Identify the types and establish the characteristics of public services which could be provided with the aid of telecommunications satellites.

2. Identify, analyze and criticize existing policies and institutional structures which affect the introduction of such services.

3. Examine in broad terms the economics of satellite delivered public services and attempt to identify those services which appear to have the highest value commensurate with their roots.

4. Identify plausible plans of action and working models (projections) which could be the basis for DOC initiatives to improve the level of satellite-based public services available to Canadians, concentrating on two priority services: education and health.

5. Establish future demand estimates (traffic) and associated costs for providing this level of service.

Right from the outset, two fundamental concerns are expressed:

1. Communications satellites have a strong potential for efficiently delivering a wide variety of public services in a wide variety of settings.

2. Canadian satellites are underexploited and the improvement of their performance increases the gap between real possibilities and the use we are making of them.

In attempting to meet the objectives within the framework of the two concerns stated above, the project team decided that it would be necessary to:

1. Identify, characterise and classify public services which have or could be carried by satellite by discussions with users, service agencies, satellite carriers, government departments, etc.

2. Develop plausible models and projections of satellite-based public services and analyse them in terms of cost, public benefit and demand. Efforts will be concentrated on educational and health service delivery services.

3. Identify and discuss economic, policy and institutional factors which influence the development of public services via satellite and suggest where difficulties exist caused by these factors.

4. From the foregoing work draft action-oriented plans which could form the basis for initiatives by DOC or other agencies.

To accomplish all of this, the team adopted the following methodology:

1. Initiated briefing meetings with Department of Communications Representatives.

2. Reviewed all relevant literature that could be located.

3. Held interviews with past users, evaluators and administrators of Canadian satellite projects.

4. Conducted project team meetings to analyze and treat specific areas of concern.

## OBJECTIVES

The body of the report deals sequentially with each of the objectives. What follows are brief summaries of what the report contains under each objective.

### Objective 1:

The team's investigations lead it to conclude that the emphasis in public service use of communications satellites has been more satellite than service oriented, i.e. the satellite has had such high saliency that it has often dominated the service being delivered. The report states that sufficient experimentation of this nature has taken place and that attention should now focus on the services themselves. If satellites can be utilized, so much the better. It lists some types and characteristics of public services which could be provided with the aid of telecommunications satellites and suggested some possible modes in which these could be carried out. The listing contains "something old and something new". The report recommends that a series of thorough analyses of public service needs must now be conducted to bring about a true marriage of service and satellite.

Within Objective 1, the team dealt with the following services and their characteristics in some detail:

1. Formal Education and Training

   a) formal classroom type education
   b) in-service training
   c) professional supplementary training
   d) co-operative educational exchange
   e) tutoring service

2. Informal Education and Training

   a) continuing education
   b) knowledge sharing
   c) second language practice
   d) native language and heritage preservation

3. Health

   a) primary care service
   b) local health care training
   c) community health care training
   d) secondary health care services
   e) health administration

4. Information

   a) library service
   b) news service
   c) mail service
   d) joint authoring service
   e) publishing service
   f) teleshopping
   g) data transfer

The team also described very briefly other potential services: recreation, democracy, community stimulation, community exchanges, research, energy, child exchanges. The list of services the report provides is viewed as indicative of satellite public service potential and is by no means considered exhaustive.

Objective 2:

The project team experienced difficulties in identifying policies for public service use of telecommunications satellites. Lack of any central agency to whom it could turn to for guidance, large numbers of oral communications as to what "the policy really is", and apparent policy co-ordination problems between federal and provincial authorities led us to abandon efforts to catalogue policies. Instead, the report attempts to identify policy areas that team members feel require attention - this, based on interviews and report reading - and making informal suggestions about policy that might be developed within these areas. Suggestions are deliberately kept general, because of the highly complex nature of policy planning for public service satellite use and the large number of persons who must be consulted before a policy decision can be made.

Synthesizing the opinions of persons team members met (or whose reports they read), the report offers policy suggestions in the areas of funding, expertise requirements, priority setting, government jurisdictional conflict, modifications to existing systems, training, project selection, screening committees, and project exchanges, co-operation and co-ordination.

Objective 3:

The team experienced great difficulty in assessing satellite delivered service in objective economic terms. In an attempt to analyze this difficulty it identified the following as major factors:

- o inadequacy of cost data base in explicit terms
- o virtual absence of adequate methodology for determining operational costs
- o and specifically for relating and comparing experimental - and commercial-type modes of operation
- o and for aggregating a number of services of similar or dissimilar type
- o specific difficulty in quantizing "intangible benefits"

This situation is reflected in a considerable number of documents (and particularly in Hermès evaluation reports) which it examined in the course of this study. While some investigators identified specific cost factors for consideration and recall some economic ratios of significance, no comprehensive treatment of the problem appears with sufficient clarity to form the basis for comprehensive analysis.

The report lays no claim to being the first to identify the root cause of this situation and suggesting a remedy; it has been stated before: "For long range planning optimization... a simplified approach to cost is needed." (Casey and Palmer, 1977)

In full agreement with this statement, the project team sets out deliberately in search of precisely such a "simplified approach"". The report states that "the outcome of this effort exceeded our boldest expectations: The 'new approach' is so simple in concept and implementation that meaningful cost analysis can be performed by individual experimenters, equipped with hand-held programmable calculators.

The report suggests that a first modest, but vital step towards a full and comprehensive economic analysis of experimental satellite systems has been taken.

Objective 4:

Based on inputs from a wide variety of sources, the team came to the conclusion that satellite project teams in education and health care urgently require models which they can utilize to guide the planning, carrying out and evaluation of their satellite projects.

The report, therefore, provides three models. The first, Satellite Technology (ST) Development Model, offers a systematic set of guidelines for preparing and developing a telecommunications satellite project for either education or health care. The second, Simulation in Satellite Projects: Planning, Testing, and Preparing for Transmission, offers a number of simulation suggestions in non-technical language and includes a rule of thumb for determining how much simulation a project team should get involved in. The third essay-model, Simulations and Games Through Satellite Technology, concerns itself with overcoming the aridity and self-consciousness of communication via satellite. Overall, the project team considered this objective to be of special importance and permitted itself to expend considerable attention on it. The purpose was to provide practical performance aids to telecommunications satellite users in the education and health fields.

Objective 5:

The project team was unable to establish future demand estimates and associated costs for public service satellite use in education and health. This was due to an insufficiently reliable data base from which the team could make predictions with any degree of accuracy. The report asserts that only through a co-ordinated effort in the public service sector can meaningful estimates be derived. It stresses the importance of aggregation of public service organizations, as the major means for stabilizing public service satellite use and offering some semblance of coherence among future projects. It concludes with a brief sketch of a possible aggregation model which it names PANACAN.

CONCLUDING REMARKS

Under each of the five objectives within the report, the project team offers what it considers to be valid and valuable information, ideas and suggestions. The report itself concludes with five fundamental recommendations:

1. DOC and other responsible agencies must continue to orient their thinking away from satellites and toward public service. The emphasis should be placed on carrying out thorough needs assessments to discover what constitutes priority public services. Once this has been performed, we can go on to systematically select the most cost beneficial means of delivering these services including telecommunications satellite delivery either exclusively or as an integral part of a combined system. Telecommunications satellites are not to be used for public service because they are there, but because they are relevant.

2. A task force should be created to explore the creation of a public service satellite agency such as PANACAN, the one we have invented. During the experimental phase, while the potential for public service delivery via satellite was being explored, a certain amount of informal and at times random behaviour was permissible. Redundancy, reinvention of the wheel and low benefit to cost ratios were affordable. Now the move is toward more coherent programmes and more rational ways of delivering needed services via satellite. Aggregation of users and services is essential. And a well-endowed agency that fits the special Canadian context is a sine qua non to further sensible public service exploitation of telecommunications satellites.

3. There is still far too much unsystematic behaviour associated with satellite projects at the user level. We have attempted to introduce several functional models for:

   a) systematically planning and carrying out a public service satellite project;

   b) integrating simulation into both the project preparation and communications processes;

   c) teasing out and even calculating cost-benefits.

   These models require experimental application and evaluation. Development of comprehensive and comprehensible procedural models for users should be made a priority.

4. Efforts must be made to systematically bring together in some coherent manner all the literature available on public service satellite use. Fugitive materials must be tracked down. Without this task being performed, there remains the strong dangers of:

   a) Project proposers attempting to recreate what has already been done.

   b) Screening committees approving projects that have already been performed.

   c) Painful unnecessary failures that could be avoided through forewarning.

   d) Stagnation because of a lack of documentation that charts both progress and success.

   e) A lack of co-ordination cause by ignorance of what is occurring elsewhere.

   f) Poor policy planning and decision-making due to insufficient information being available.

   g) Lack of break-through advances because of incomplete data.

5. All agencies involved in public service satellite use, both federal and provincial, must find a means of co-ordinating their policies and efforts with one another. In this field of communications, communications is currently very poor. A co-ordinating agency, preferably one that is linked with public service aggregation efforts, is necessary if there is to be progress.

A brief annotated bibliography is included in the appendixes along with a list of persons and organizations contacted and a letter introducing the project to interviewees.

## ACKNOWLEDGEMENTS

We would like to thank everyone who helped us prepare this report. The list is a rather long one, beginning with all those who spent valuable hours meeting with us, answering our questions and providing us with details of their own projects. Their names appear in Appendix B of this report. We also owe a special debt of thanks to our project officer, COLLIN BILLOWES, of the Department of Communications, whose facilitating presence we felt at every phase of the project. With humility, we gratefully acknowledge the capable secretarial assistance of Francine Boisclair who performed miracles with the scraps of information and very rough roughs we handed her. Finally, we thank you for taking the time to read this report, ponder our findings, and perhaps even act on some of the recommendations we have put forward.

Pierre Pérusse, Project Director

## INTRODUCTION

We begin this report with a basic underlying premise: communications satellites have a strong potential for efficiently delivering a wide variety of public services in a large number of settings. This has been demonstrated in Canada on Hermès, in the USA on both Hermès and AT-6, in France, Germany and Ivory Coast on Symphonie, and in India on ATS-6. Along with this strong affirmation, we approach our report with a fundamental concern as well: despite the demonstrated potential of communications satellites, their use in the public sector has often been inappropriate. Generalizability from one experiment to the next has frequently been impossible. In addition, certain groups of users have tended to dominate public sector exploitation of the satellite with varying degrees of effectiveness. The result is, as Dr. W. Melody of SFU stated at the December 1977 Symposium on Hermès in Ottawa, that "...the Canadian satellites are underexploited and the improvement of their performance increases the gap between real possibilities and the use we are making of them".

There is an explanation for this underexploitation. Satellite hardware technology has evolved with far greater rapidity than the public sector has been able to absorb its evolution. In this respect, satellite technology is not the only example of a domain in which software development and appropriate exploitation has lagged behind engineering advances. Even in the area of audiovisual technology, a large gap exists between the sophistication of the hardware and the public's ability to make effective as well as innovative use of its full potential. To cite another example, currently, the Associate Committee on Instructional Technology of the National Research Council is wrestling with the problem of how to make use of computer technology in educational and training settings. Once again the engineers' ingenuity has far outstripped the non-technologically-sophisticated potential consumer-public's capacity to absorb it.

If we may continue the analogy between the lag in appropriate use of satellite technology and that of other evolving technologies, we become increasingly aware of the need to develop strategies for allowing non-engineering human beings to interact with what appear to be awesome, complex technologies. Among those who have been most sensitive to this need have been the instructional/performance technologists whose primary goal is to discover ways of systematically designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, <u>while employing a combination of human and non-human resources to bring about more effective instruction</u>.

The fact that Canadian and American universities have been rapidly expanding their graduate programmes to turn out instructional technologists who attempt to make the most effective use of <u>all</u> technologies attests to the importance of this emerging group of educational engineers/change agents/technology consumption facilitators.

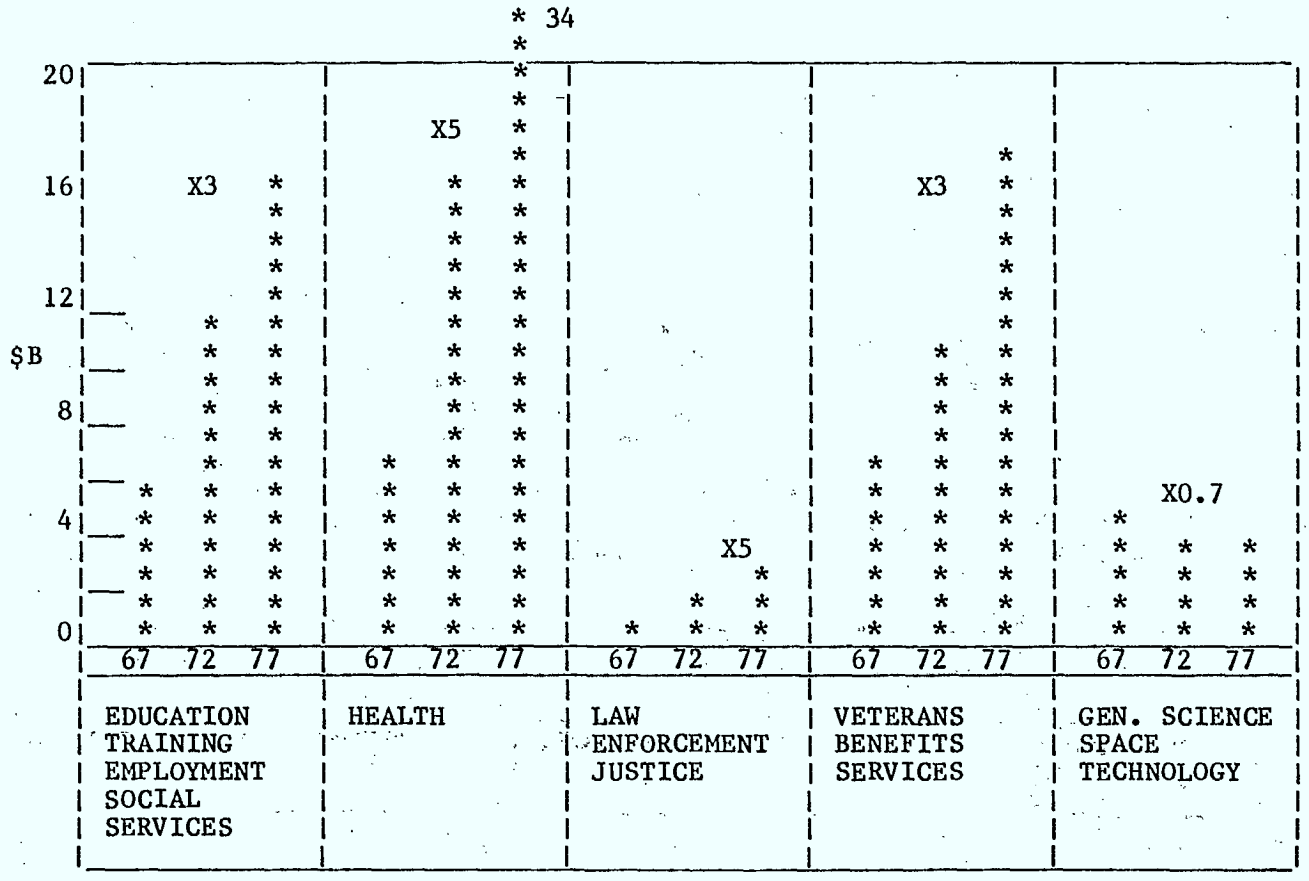
If we appear to be emphasizing the importance of a bridge-building role between technology and consumer right at the outset, it is because we have designed this report from an instructional/performance technology point of view. Our examination of the literature has convinced us of the satellite's potential to improve

public services. In this project, we center our attention on two important public-related services:

- health care delivery
- education and training

We have selected these because to-date public service satellite projects (see Figure 1) have tended to cluster in these two fields.

FIGURE 1: UNITED STATES PUBLIC SERVICE SATELLITE PROJECTS




(BRANDSFORD & POTTER, 1978. P. 11)

Within these two public service sectors, we concentrate on the goal of increasing and improving the quality of public service. As will become apparent throughout the report, our first concern lies with services. Although we seek means for applying satellite technology for service improvement, we constantly bear in mind the fact that other solutions also exist. We suggest that all resources be considered and that the optimal technology or combination of technologies be employed for upgrading existing services as well as creating new ones.

Based on information we have accumulated through our reading and discussions with past satellite project participants, we attempt to go beyond what has already been tried. Past experiments as well as presently proposed ones for Anik-B, by the very way in which they have either been conducted or conceived do not appear to us to possess all the potential for closing the "gap" between communications satellite technology capabilities and its present use. In examining past projects and comparing outcomes with current education and health care delivery needs we feel that a broader perspective is required than has hitherto been applied. And that is the direction this report takes. Based on past experiences and present education and health needs it focuses on ways of effectively utilizing satellites in the not-to distant future.

Our objectives in this project were to:

1. Identify the types and establish the characteristics of public services which could be provided with the aid of telecommunications satellites.

2. Identify, analyze and criticize existing policies and institutional structures which affect the introduction of such services.

3. Examine in broad terms the economics of satellite delivered public services and attempt to identify those services which appear to have the highest value commensurate with their roots.

4. Identify plausible plans of action and working models (projections) which could be the basis for DOC initiatives to improve the level of satellite-based public services available to Canadians, concentrating on two priority services: education and health.

5. Establish future demand estimates (traffic) and associated costs for providing this level of service.

In the following sections of the report, we endeavour to cover each of these objectives in a logically connected sequence. We conclude this report with a brief set of recommendations directly related to our findings.

## METHODOLOGY

In this section we explain the methodology we used in attempting to fulfil our contract. Our proposal for the project stated that our basic approach would be to:

1. Identify, characterise and classify public services which have or could be carried by satellite by discussions with users, service agencies, satellite carriers, government departments, etc.

2. Develop plausible models and projections of satellite-based public services and analyse them in terms of cost, public benefit and demand. Efforts will be concentrated on educational and health service delivery services.

3. Identify and discuss economic, policy and institutional factors which influence the development of public services via satellite and suggest where difficulties exist caused by these factors.

4. From the foregoing work draft action-oriented plans which could form the basis for initiatives by DOC or other agencies.

To accomplish all of this, we broke our activities into a series of sequential steps:

### 1. Briefing Meetings with Department of Communications (DOC) Representatives

It was most important to receive some form of orientation from persons working within DOC who were concerned with the public service use of satellites in Canada, particularly as they represented the funding agency and could articulate DOC's priorities. These meetings permitted the project team to formulate its own priorities within the project. They also helped it to identify sources of information that would be crucial for us to come in contact with to attain our objectives. As a result of these briefing meetings, a clearer picture emerged of achievements as well as weaknesses in public service satellite use. The team was also able to prepare a list of other persons to contact based on recommendations of the DOC representatives.

### 2. Review of the Literature

Of fundamental importance to the project was a thorough examination of past achievements with satellites as well as a familiarization of communications satellite technology potential. The team amassed a series of documents, especially reports of past experiments in Canada, the U.S. and Europe. The Hermès reports, ANIK programmes, PSSC reports and experiments, and future project descriptions for ANIK B were all very useful. Appendix A of this report includes a brief annotated bibliography of the print materials we found most relevant. We suggest that other researchers interested in the use of satellites for public service acquire this basic set of published materials.

In reviewing the literature, we were most interested in the recommendations that emerged from various experiments. We were particularly sensitive to patterns of recommendations that developed. In the area of education, we found especially useful the report written by Daniel, Côté and Richmond: 1977 Educational Experiments in Canada with the Communications Technology Satellites. In the area of health care delivery, two reports, one by Roberts, House and McNamara: TeleMedicine at Memorial University of Newfoundland, 1977 and the second by Carey and Russell: The Canadian Communications Technology Satellite Experiment Project, 1975, proved most helpful.

In attempting to survey the literature of satellite use in the public service sectors, we found that we had a great deal of difficulty in accessing information and synthesizing it in some coherent form. Although we sensed that a summary of past projects ought to be compiled and organized in a form that would make access convenient and meaningful for users (and we were sorely tempted to do this ourselves), the team decided that this was not within its mandate and so did not prepare this summary. Team members studied the materials and extracted relevant details.

3. Interviews with Past Users, Evaluators and Administrators of Canadian Satellite Projects

The project director interviewed a number of persons who had been involved in a wide variety of satellite projects within the education and health fields in different parts of Canada. A list of persons and organizations contacted appears in Appendix B. The purpose of the interviews was threefold:

a) To see if satellite project participants, now that their projects were completed and they had taken some distance from them, had points of view which differed from those they had expressed in their reports immediately following their projects;

b) to have these knowledgeable persons discuss the objectives of our project;

c) to elicit perceptions as to what urgent problems, what solutions might be envisaged and in the light of past experiments, predict future demands on communications satellite systems within their fields.

In order to contact interviewees and gain the information we desired, the following steps were taken:

a) A letter introducing the project team and its purpose was sent to potential interviewees (see Appendix C).

b) Each person/organization was then contacted by telephone to arrange a face-to-face interview.

c) The project director went to each site and met the interviewees.

The interviews were held in a relatively informal manner. The atmosphere that the interviewer attempted to create was a non-threatening one. No hint of censure was allowed to enter into the interview. The exchange was loosely structured in accordance with the objectives of the project. The main purpose of the interview was to get the interviewee to speak freely. Because of this approach, the team gained many insights and accumulated information that went deeper than what had been expressed in the published reports.

4. Project Team Meetings to Analyse Information and Treat Specific Areas of Concern

As information on problems and needs was gathered, patterns began to emerge. Recurring areas of concern appeared to cluster around several major themes:

a) The need for some systematic approach to the design and development of satellite projects in education and health services both at the project planning stage and in the actual carrying out of the project once funding and satellite time has been approved.

b) Some systematic means for integrating simulation techniques at various stages of a project's development to increase efficient use of satellites while decreasing error and stress. Within this particular area of concern, the team felt that simulation in the communications process itself would be beneficial.

c) A cost-benefit model to evaluate the appropriateness of satellite use for a given project. This particular theme was the one most frequently stressed at DOC, by interviewees, and in the literature (along with scepticism as to the possibility of ever devising one).

d) The utility of an aggregation model to group together disparate satellite use attemps in the public services sector, provide expertise to the small non-profit user, render more coherent experimental satellite use, rationalize and render more accessible public service satellite time and act as a documentary clearinghouse for the public service user.

Tasks were divided among individual team members who produced working draft documents which were circulated among all team members, debated and revised. The final results of individual team members' efforts are included at various points within this report.

## OBJECTIVES

In this section we turn to the objectives of the project and our attempt to meet them. Attainment of objectives as set out in the original contract was both uneven and in some cases partial. Lack of information in both areas of policy and costs made achievement of Objectives 2 and 3 somewhat difficult to totally meet. This information problem necessarily impacted on Objective 5 which deals with future demands. In contrast, discussions with individuals as well as recommendations in the literature permitted us to identify a wide range of types of public services for Objective 1. Objective 4 on models is also dealt with in a fairly comprehensive manner. It is important to stress that the project team is not an engineering one. Its approach was essentially service and user-oriented and was less concerned with the technicalities of satellite use than most of the reports it consulted.

### In the Beginning was the Satellite...

If we examine the genesis of public service satellite use, we immediately gain the impression that in the beginning there were communications satellites and that a certain number of imaginative individuals, seeing that they were "good" decided that these flying wonders ought to be used for the benefit of the public. The result was a focusing of attention on "how to use the satellite most effectively in public service fields". The emphasis was on the satellite. Experiments which followed confirmed, to some extent, that certain services could indeed be offered via satellite, and in some cases only, through satellite use. Public service exploitation of satellite technology became less science fiction and more of a reality as education, health science, community action groups and even justice and law enforcement "got into the act".

Now that sufficient numbers of persons are aware of satellite use and expectations have risen in the public sector, it is time to re-orient our attention away from the satellite and toward public service itself. This is the point of view the project team adopted. Rather than begin with the satellite, it turned its attention toward various public services that Canadians might require. Only after it had prepared an indicative list, based on its discussions and reading, did it ask itself how satellite technology might become involved.

### OBJECTIVE 1: Identify the types and establish the characteristics of public services which could be provided with the aid of telecommunications satellites.

A number of different types of public services have already availed themselves of communications satellite use. These, for the most part have tended to cluster into five major areas:

1. Education and Training
2. Health
3. Law Enforcement and Justice
4. Science and Technology
5. Social Services and Benefits

Not excluding these categories, we decided to build on them and at the same time go beyond to identify other types of public services that might ultimately avail themselves of communications satellite use. These are presented below along with their primary characteristics and some sample potential satellite mode applications.

1. Education and Training

One of the most commonly accepted public service uses of satellite technology, simply in terms of number of projects initiated and proposed, is in the area of education and training. We have broken this category of service into two major subdivisions: formal and informal education and training.

Formal Education and Training

By this, we mean structured courses specifically designed to be part of an accredited educational or training programme, in-service training, professional supplementary training, and course work that are related to career or organizational needs.

Table 1 provides sample services that would fall into this formal education and training category along with their primary characteristics.

TABLE 1 - SAMPLE FORMAL EDUCATION/TRAINING SERVICES

| Service | Characteristics |
|---|---|
| Formal classroom type education courses | 1. An instructor or instructors is/are present with a clearly defined curriculum.<br>2. Students are enrolled in a programme leading toward a diploma.<br>3. There is a presentation of content, student exercises, questions and answers.<br>4. Students may or may not be at a single location.<br>5. Feedback on student activity is essential.<br>6. Students have assignments, projects and/or examinations. |

Formal Education and Training (Cont'd)

| Service | Characteristics |
|---|---|
| In-service training | 1. Practitioners of a profession or trade are required to upgrade skills or increase their knowledge base.<br>2. Instructors/Demonstrators present a clearly defined content and set of objectives.<br>3. There is presentation of content including demonstration.<br>4. Students practice and ask questions.<br>5. Students may or may not be at a single location.<br>6. Generally some form of monitoring of skill or knowledge acquisition is required.<br>7. Generally some form of student follow-up with instructor for additional information and feedback is required.<br>8. Often interaction/discussion among student practitioners is required.<br>9. Individual tailoring of content to specific contexts may be needed.<br>10. A workshop atmosphere may be useful. |
| Professional supplementary training | 1. New information or innovative techniques are made available for practitioners of a profession or trade. |

Formal Education and Training (Cont'd)

| Service | Characteristics |
|---|---|
| Professional supplementary training (cont'd) | 2. Instruction/demonstration is required.<br>3. A high rate of interaction is needed between experts and practitioners to clarify, tailor and fine tune.<br>4. Follow-up on the part of receiving practitioners is required.<br>5. Documentary (print) materials are generally needed (e.g. manuals, performance aids, catalogues). |
| Co-operative educational exchange | 1. Students are in different geographical locations.<br>2. Expertise is available in different geographical locations.<br>3. Students and experts pool and share resources, expertise, information. |
| Tutoring service | 1. Individual requires educational assistance.<br>2. A tutor furnishes assistance including feedback on learner activity.<br>3. Regular meeting times are scheduled.<br>4. Quiet spaces for tutor and learner are required. |

## Informal Education and Training

There is a growing trend among Canadians, as leisure time and the educational level of the population increases, to engage in various forms of continuing education. No longer constrained by traditional classroom configurations, the Canadian public, as evidenced by the dramatic rise of community colleges and continuing education programmes in high schools and universities throughout the country, has begun to enroll in all sorts of courses. The purpose of continuing education service is to provide additional non-credit education that individual citizens themselves wish to acquire. This form of education, in contrast to formal education and training, is oriented toward personal interest needs rather than those related to career development and professional or organizational efficiency/effectiveness. In Table 2 below, we list some forms of informal education and training services.

TABLE 2 - SAMPLE INFORMAL EDUCATION/TRAINING SERVICES

| Service | Characteristics |
|---|---|
| Continuing education | 1. Persons share common interests in a particular subject.<br>2. Expert or experts are available who know the subject.<br>3. Initiative for providing a specific course stems either from a community, individual learners or a dispensing institution.<br>4. Explanation and/or demonstration is/are required.<br>5. Interaction between learners and instructors is necessary.<br>6. Feedback and follow-up questioning are required.<br>7. Some print material may be needed.<br>8. Students may or may not be at a single geographic location. |

Informal Education and Training (Cont'd)

| Service | Characteristics |
|---|---|
| Continuing education (cont'd) | 9. Materials and supplies (e.g. clay, art paper, food, wood, tools) may be required before the course begins.<br>10. Some interaction among students may be beneficial.<br>11. Demonstration of finished products may be beneficial. |
| Knowledge sharing | 1. Person(s) in one area may have useful skills for persons in another area.<br>2. Knowledge is exchanged in an informal manner.<br>3. Follow-up and feedback may be required.<br>4. Demonstration may be essential. |
| Second language practice | 1. Persons learning a second language talk to native speakers.<br>2. Exchanges on topics of common interest take place.<br>3. The atmosphere is informal.<br>4. Exchanges may be sporadic or regular.<br>5. Interspersed with informal exchanges may be structured sessions including deliberate language testing. |

Informal Education and Training (Cont'd)

| Service | Characteristics |
|---|---|
| Native language and heritage preservation | 1. Persons of a particular ethnic or linguistic group isolated or dominated by a larger group (e.g. Ukranians in Belleville) wish to preserve their linguistic and/or cultural identity.<br>2. Informal "get-togethers" among isolated groups or with larger clusters of the same ethnic group take place.<br>3. There is a sharing of religious communion, handicraft skills, recipes and cultural activities.<br>4. Formal language training sessions may be designed.<br>5. Discussions of ethnic preservation, family problems, marriage possibilities may be organized.<br>6. Exchanges are generally organized by persons who are very unfamiliar with complex communication technology. |

In both formal and informal education and training services a far greater number of needs exist than have been treated by past satellite experiments. In this area, the potential service needs go considerably beyond the indicative list we have provided. We shall return to this point later when we deal with policies and future traffic demands.

Health

The health sciences quickly realized the potential of communications satellites for providing health services to isolated communities. In Table 3 below, we identify some needed health services, their characteristics and some sample potential modes of satellite use that could be involved. We borrow heavily, in this section, from the TeleMedicine Experiment in Canada Using Satellite, Hermès (Carey, Russel, Nov.1977).

TABLE 3 - SAMPLE HEALTH SERVICES

| Service | Characteristics |
|---|---|
| Primary care service | 1. Communities are suffering from inadequate social and health services requiring general primary health care delivery.<br>2. Communities may be experiencing health (and social) problems related to alcohol, tobacco, and/or drugs and require treatment.<br>3. Community may require assistance with nutrition problems.<br>4. Because of inadequate dental service, oral hygiene may be very poor and need attention.<br>5. There may be a high incidence of V.D. that needs controlling.<br>6. Food and/or water may be contaminated requiring training in food and water treatment and storage.<br>7. Community may require assistance to improve inadequate housing, washing and sewage facilities that cause disease.<br>8. Diagnosis may be needed for emergency illnesses.<br>9. Community may be largely made up of transients requiring short term health care and direction. |

TABLE 3 - SAMPLE HEALTH SERVICES (Cont'd)

| Service | Characteristics |
|---|---|
| Local health care training | 1. Local health personnel require additional training.<br>2. Local health personnel are generally isolated.<br>3. Personnel are given teaching by experts in primary health care, community relations, etc.<br>4. Interaction among health officials are held to exchange problems and solutions.<br>5. Demonstrations of techniques or apparatus are included.<br>6. Emergency treatment procedures are explained and tested. |
| Community health care training | 1. Isolated communities receive health care information.<br>2. Local languages are employed.<br>3. Experts who have credibility teach and demonstrate.<br>4. Questions are asked and answered.<br>5. Geographically separated communities discuss common problems and solutions. |
| Secondary health care services | 1. Medical personnel consult with each other.<br>2. Medical support services are linked to isolated communities. |

TABLE 3 - SAMPLE HEALTH SERVICES (Cont'd)

| Service | Characteristics |
|---|---|
| Secondary health care services (cont'd) | 3. Physiotherapy treatments are directed.<br>4. Nursing techniques are demonstrated.<br>5. Poison control is taught.<br>6. Medical specialists are linked to distant communities. |
| Health administration | 1. Seminars are held among administrators.<br>2. Administrative training sessions (e.g. MBO) are held.<br>3. Joint health policy planning sessions are held among communities.<br>4. Co-ordination of services and resources use as planned. |

As with education, the listed services are only indicative of the vast number of services that could be linked to communications satellite use. Needs analysed in this sector as well as others can uncover other essential services and their characteristics as well as the potential benefits accruing from satellite use.

3. Information

A large number of information services are needed by all Canadians. Where access to information is difficult, the general quality of life decreases. Below in Table 4 are some sample information services that could be of immense service to citizens:

TABLE 4 - SAMPLE INFORMATION SERVICES

| Service | Characteristics |
|---|---|
| Library services | 1. Library users select from diverse sources, materials s/he requires.<br>2. Users receive specialized bibliographies related to specific areas of interest.<br>3. Users scan abstracts of actual text material.<br>4. Users receive hardcopy of library materials.<br>5. Consumers may interact with librarians.<br>6. Libraries inform users of new acquisitions.<br>7. Reading programmes for individual users are designed.<br>8. Library use training is given. |
| News services | 1. Electronic newspapers are constantly updated and permanently available.<br>2. News is delivered in native languages focusing on specific target population needs.<br>3. Communities trade news to maintain common identities.<br>4. Isolated communities are linked for news discussions.<br>5. Communities prepare news magazines for sharing.<br>6. Non-profit advertising is available. |

TABLE 4 - SAMPLE INFORMATION SERVICES (Cont'd)

| Service | Characteristics |
|---|---|
| Mail service | 1. Isolated communities can "send letters" where delivery is difficult or takes a long time.<br>2. Records can be transmitted to inaccessible locations.<br>3. A single letter can be sent to a wide variety of receivers. |
| Joint authoring service | 1. Two or more authors can draft a single test from different locations (e.g. petitions, announcements, scripts).<br>2. Authors can store, retrieve, edit and/or transmit completed text. |
| Publishing service | 1. Authors can publish materials which others access at a price.<br>2. Educational programmes, plans, games etc. can be made available to all service users. |
| Teleshopping | 1. Consumers access catalogue information.<br>2. Consumers can compare prices and quality instantaneously.<br>3. Consumers can access consumer reports and expert critiques.<br>4. "Better Business Bureau" information is made available. |

TABLE 4 - SAMPLE INFORMATION SERVICES (Cont'd)

| Service | Characteristics |
|---|---|
| Teleshopping service (cont'd) | 5. Buyers can effect purchasing transactions including ordering and payment.<br>6. Buyers can monitor delivery.<br>7. Demonstrations or approved products can be accessed. |
| Data transfer | 1. Large amounts of data are rapidly transmitted from one point to another.<br>2. Security of data transfer is assured.<br>3. Monitoring data or research information can be transferred to storage.<br>4. Law enforcement bulletins can be distributed very broadly.<br>5. Individual records can be transferred for transients to different points. |

4. Others

As we pointed out at the start of this report, we have limited ourselves to the major public service sectors of education and health. Already we have gone beyond our intention because of the vast public service needs that have become glaringly evident to us through our reading and discussions. Without going into detail, we list the following public service domains that appear to us to have strong potential for communications satellite technology use:

a) Recreation: Individuals and groups require information, ideas and activities in isolated communities on how they can employ their leisure time. This includes focusing interest on community fairs, construction of facilities (e.g. swimming pool, basketball court) and group and individual recreational activities (e.g. sports, calisthenics, hobbies).

b) Democracy: Conducting meetings, planning petitions, organizing action groups or community drives requires communications and expert assistance. Living in a democratic nation, Canadian citizens and immigrants

should be aware of what is occurring in their country's institutions and develop patterns of behaviors consistent with the democratic liberties they possess.

c) Community stimulation: Apathy is a common characteristic of isolated communities. The opening up of a community to the outside world can transform its spirit.

d) Community exchanges: Diverse ethnic and linguistic as well as geographic communities learn about each other through exchange sharing, demonstrating and participating in common projects.

e) Research: Individual researchers working in highly specialized areas can be put in contact with one another to share information. Research seminars, think tanks or conferences can also be useful in bringing researchers together to share knowledge and stimulate new efforts.

f) Energy: As energy becomes a critical issue and the prospects of energy shortages increase, training and information on energy savings, conversion of traditional heating and electrical systems to less oil dependent ones becomes important.

g) Child exchanges: This can become highly important for children who are relatively isolated and have few other or different children to play with. Children learn a great deal from one another; much of it is necessary for normal development.

5. Mode Exploration

Satellites have introduced new telecommunications modes (e.g. Two way video/audio in teleconferencing or in medical diagnosis, slow scan and one/two way audio for diagnosis and training in remote communities. Many more modes and mode combinations still require exploration both in experimental projects and simulations with or without the use of a telecommunications satellite.

We believe it would be a worthwhile exercise to explore optimal mode/mode combinations for delivery of the sample public services we have generated above.

Summary for Objective 1

Our investigations have led us to conclude that the emphasis in public service use of communications satellites has been more satellite than service oriented, i.e. the satellite has had such high saliency that it has often dominated the service being delivered. We feel that sufficient experimentation of this nature has taken place and that attention should now focus on the services themselves. If satellites can be utilized, so much the better. We have listed some types and characteristics of public services which could be provided with the aid of telecommunications satellites and suggested some possible modes in which these could be carried out. In our listing we have provided "something old and something new". A series of thorough analyses of public service needs must now be conducted to bring about a true marriage of service and satellite.

OBJECTIVE 2: Identify, analyse and criticize existing policies and institutional structures which affect the introduction of such services.

The project team experienced difficulties in dealing with this second objective, especially with respect to policy identification. More than likely because of the innovative nature of public service satellite use and the number of different governments and agencies involved, the team found it difficult to discern exact policies. What the team did discover was that DOC has in general evidenced a great deal of open-mindedness and flexibility in dealings with users. The positive outcomes of such an approach has been the encouragement of a broad range of experimentation. The negative side has been to leave users somewhat uncertain as to what basic policies do in fact exist. To some extent this uncertainty manifested itself in the two symposia on ANIK B and HERMES (1977 and 1978) which were held in Ottawa. Despite a great deal of exchange of opinion and points of view, no firm answers as to what constitutes effective public service use of telecommunications satellites emerged. The DOC as well as other government agency positions remain, from our perspective, unclear.

This vagueness of policy produced some frustrating moments for the project team. Very little concrete, specific policy presented itself for identification and analysis. This frustration is one the team also heard repeatedly echoed in its interviews with users.

Rather than continue its somewhat fruitless search for clearly enunciated policy statements, the team decided to focus its attention on policy areas that it felt required attention on the part of the appropriate authorities. Synthesizing the opinions of those persons we met (or whose reports we read) the project team decided to offer policy suggestions in the areas of funding, expertise requirements, priority setting, government jurisdictional conflict, modifications to existing systems, training, project selection, screening committees, and project exchanges, co-operation and coordination.

Funding

1. Information concerning satellite access and the funding of satellite projects for non-profit public service use is not given the wide diffusion many other programmes enjoy. Potential users have difficulty obtaining accurate information on funding policies, particularly if they have not had prior contact with DOC or someone already "initiated" into satellite use. Potential users require clear, non-technical information that simply and straightforwardly sets out the rules of elegibility for satellite access and/or funds.

2. Rules for funding should make users aggregate resources to avoid unnecessary costs.

3. Access and funding should be made in three categories: short-term, medium term and long range (up to three years). The importance and potential-for-success of the project, especially in terms of cost benefits should help determine the life of a project.

4. Project funding should be made on a realistic basis from the pre-planning stage, through production and implementation, to evaluation and institutionalization. At present, satellite project budgeting and cost monitoring is erratic and highly individualized. There are insufficient guidelines for potential users.

5. When funding is allocated, a given percentage should be earmarked for personnel training through project exchanges and co-operation. Less sophisticated users should be given the opportunity to learn from experienced project teams.

6. Funding dollars allocated to users by DOC or any other similar agency should be offered in the form of a service contract to the receiving institution or organization.

As a final comment, funding policy in the public service sector with regard to satellite use is at present unclear. Public service has no counterpart to the type of loan arrangement the Government of Canada has made with the private sector (e.g. Telesat, $25,000,000). Health and education as well as other services do not benefit from any form of structure to support them not adequate funding arrangements to improve service. Unambiguous, clearly defined and widely disseminated policy statements and generously funded structures are required.

Expertise

1. At present, a group wanting to utilize telecommunications satellites to deliver a public service is at a loss if it connot find a satellite expert to guide its proposal writing. This leaves technically unsophisticated potential users at a disadvantage. Some mechanism or organization that can act as an expert consultant is needed to assist prospective users.

2. What is true for proposal preparation can be repeated for the areas of systematic planning and budgeting for a satellite project. A mechanism should exist to diminish the effect of expertise in this area by offering assistance to less experienced users.

3. Emphasis should be placed on expertise sharing among public service projects.

Training

1. Related to the area of expertise is that of training. Most users interviewed stated that the training of persons to operate with satellites would significantly increase the effectiveness and efficiency of public service projects. Co-ordinating teams of technicians, communications specialists and content persons as well as users requires special skills that should be developed through training.

Priorities

1. Priority setting for project selection is a critical policy problem. Priorities should not be set by engineers or bureaucrats. A very broad range of interests should be consulted prior to the setting of priorities.

2. With the emphasis on public service as opposed to satellites, major issues such as urban-rural disparities in services, cultural and linguistic problems, geographic and ethnic isolation, research needs, community needs, alternative lifestyles, leisure, aging, health care information, and access to the democratic process should all be considered as areas deserving priority attention. No sector should receive priority treatment because of technical convenience.

3. Taking into account all of the above, policy with relation to priority setting, should first focus on the pressing needs of citizens regardless of sector and on regions where emergency or basic services are lacking before turning to specific content areas and interest groups.

Government Jurisdictions

1. Policy as to which government and/or organism is responsible for which aspect of satellite use should be clearly delineated and made evident to users. The team perceives the federal government to be the prime originator of satellite use policy in the public sector. Consultation with all governments should occur prior to policy setting.

2. All governments should be advised of all policy decisions taken at all government levels via a central clearinghouse agency established for the purpose of co-ordinating policies. Policy information should be made readily available to potential and actual satellite users in a very comprehensible and up-to-date form to avoid unintentional jurisdictional conflicts.

3. Given the problems we experienced in attempting to discover and untangle policy, the clearinghouse mentioned above should also act as an information dispenser to all governmental agencies, both federal and provincial, and to the public at large in terms of what policies exist in the field of public service delivery via telecommunications satellites.

Screening Committees

1. Announcements go out concerning public service access to satellites and institutions or organizations are invited to propose projects. Who decides which projects are to be accepted? Just as with priority setting, screening committees should not be composed of government bureaucrats and engineers alone. A wide range of readers, including potential beneficiaries of projects, should participate in the screening of projects. Content, technical, target audience financial and communications experts should also participate in screening proposals.

2. Especially in the educational service area, instructional technologists should be represented on screening committees.

3. Screening committees should not only accept or reject proposals. Where they see high pay-off potential but weaknesses in the proposed project, they should offer assistance to the project team to strengthen the proposal.

4. Screening committees should examine proposed projects with a view to co-ordination and/or fusion of projects wherever possible, thus encouraging exchanges and even co-operative efforts. This approach could result in increased effectiveness of projects while reducing costs.

Project Selection

1. There is a danger over time that past users of satellites, having acquired skills through experience, will come to dominate public service access to satellites. This is a pattern that is partially emerging in the ANIK B series of projects. There is a strong need to set policy that welcomes new appropriate projects without discriminating against past users.

2. Project selection should be facilitated by requiring that project proposals be submitted with a certain degree of uniformity. All projects should include fully developed rationales, clearly stated objectives, detailed budgets and timelines and systematic evaluation procedures. To obtain this uniformity, clear and comprehensible guidelines must be developed to assist proposal writers with their submissions.

3. Project selection should be made on the basis of relationship to priorities as a public service, suitability for satellite delivery, technical feasibility, innovativeness, cost-effectiveness and potential for success.

Systems and Modifications

1. The emphasis having been clearly placed on public service delivery, policy should be developed to permit (perhaps even to encourage) modifications to existing hardware systems. Funding should be made available to alter communications systems and modify equipment to provide better service.

2. Funding should be set aside for projects to experiment with modifications to existing systems or individual pieces of equipment to better serve specific audiences (e.g. the handicapped or the aged). Experimentation with new communications configurations and mode combinations should also be encouraged with the view to better serving public needs.

Exchange, Co-operation, Co-ordination

1. A great deal of voluntary exchange and co-operation presently exist at an informal level among satellite users, DOC and researchers. There is a need to create policies to support and increase this form of communication consultation, not through formal conferences only, but through small group or individual exchanges in the form of conference calls and visits.

2. More formal means should be instituted for frequent exchange, consultation and co-ordination among policy planners at the federal and provincial levels, including regularly scheduled "up-date" teleconferences.

3. Efforts should be made to encourage cross-pollination of ideas via visits among projects sharing similar problems.

4. Co-operation with Québec's projects on Symphonie as well as with other countries should be encouraged and supported.

5. There should be an "open mind" policy toward profiting from the experiences of other countries' uses of satellites for public service while developing our own Canadian models.

Summary for Objective 2

As indicated in the introductory comments to the objectives section of this report, the project team experienced difficulties in identifying policies for public service use of telecommunications satellites. Lack of any central agency to whom we could turn to for guidance, large numbers of oral communications as to what "the policy really is", and apparent policy co-ordination problems between federal and provincial authorities led us to abandon our efforts to catalogue policies. Instead, we attempted to identify policy areas that we felt required attention - this, based on our interviews and report reading - and made informal suggestions about policy that might be developed within these areas. We deliberately kept our suggestions general, because of the highly complex nature of policy planning for public service satellite use and the large numbers of persons who must be consulted before a policy decision can be made.

OBJECTIVE 3: Examine in broad terms the economics of satellite delivered public services and attempt to identify those services which appear to have the highest value commensurate with their cost.

Throughout our investigation the need for a better appreciation of the cost factor was raised and stressed in our discussions with individuals involved in satellite projects. The desirable features of a cost analysis technique and model were identified as:

- Comprehensiveness
- Flexibility to cope with a variety of situations
- Ease of application (i.e. requiring a minimum of specialized skills or resources for operation)

In addition to a careful review of our own notes taken during various briefing meetings, interviews and discussions, we gave careful consideration to:

The Economics of Satellite Delivered Public Services

- "Public Television Satellite Non-Broadcast Shared Use Guide", published by the Corporation for Public Broadcasting (1978)
- A position paper on Telehealth (1978)
- The Pomfret evaluation report of the Telemedicine experiment conducted at Memorial University, Newfoundland
- Various other Hermès project evaluation reports

In those documents we also find reflected a concern for cost as a major element for basic orientation. Thus, Pomfret (1978) comments on "economic factors that must be considered in satellite-delivery public service":

> "Any Telecommunications system should be flexible and diversified to create a broad base for generating sufficient use and a sufficient base for cost allocation."

Cost Factors

The Telehealth report identifies three important factors relevant to satellite projects:

- o Set-up costs including capital outlays, installation costs and training
- o Operating costs, including personnel services, rentals, maintenance training, etc.
- o Financing

Pomfret identifies four major cost factors in connection with the Memorial University project:

- o Development costs
- o Operating costs
- o Course delivery
- o Client

It will be noted in comparing the above that there is considerable overlap in the factors cited (though the terminology used may differ) but that there is no complete agreement on what constitutes primary cost concerns.

Cost Ratios

For an evaluation of the viability of a telecommunication service delivered via satellite, Pomfret suggests the cost ratio

$$\frac{\text{proposed satellite-based system}}{\text{alternative terrestrial system}}$$

He hastens to add, however:

> "Much of the data needed to conduct an adequate analysis of costs and benefits are not available."

These remarks clearly apply even more to a derivation of benefit/cost ratios where a monetary assessment of intangible benefits is even more elusive.

Pomfret recognizes the importance of audience size and aggregation of services:

> "Continuing education programs would have to concentrate on reaching potential audiences other than physicians as there are simply not enough physicians to lower costs sufficiently."

He does not, however, pursue this development to the point of distinguishing between "direct" (or primary) benefits and "indirect" (or secondary) benefits, as will be discussed anon.

Benefits

Many benefits of satellite facilities confirmed by experimental projects, could be readily identified in our discussions with the "experimenters" and in the evaluation documents reviewed.

We have not come across any expression of these benefits explicitly in monetary terms or even serious attempts to do so. This is perhaps not surprising: it is very difficult to quantify an "intangible" benefit; any such quantification would almost inevitably represent a subjective value judgment.

We must consider, in addition, that benefits are not necessarily confined to the direct (or primary) user (e.g. physicians or teachers receiving in-service training). Thus, if the primary users (as above), exercise their newly-acquired skill and knowledge, a significant number of additional individuals (e.g. students, patients) may benefit; these latter indirect (or secondary) users need not be (or have been) participants in the actual satellite projects.

Cost Benefit Evaluation

It should be clear from the foregoing that the derivation of cost benefit ratios for a comprehensive situation (i e. primary and secondary benefits) is completely hopeless in the absence of explicit monetary data of benefits, and basic cost information.

To be sure, it may have been possible to tease out this information for a very few special and isolated situations. The result would certainly not have been comprehensive and would very likely have been quite misleading.

In view of the above, it was patently impossible to "identify those services which appear to have the highest value commensurate with their cost" with any degree of reliability.

Broad Term Analysis

It would seem all too easy to use the impossibility of a task as an alibi for not performing it - and leave it at that. We did not wish, however, to leave it at that and addressed ourselves to the question of how one could come to grips with the problem and in what direction a solution might be found.

We have come to the conclusion that an essentially user-oriented cost analysis must be the first vital step. This analysis must be comprehensive yet flexible enough to give a variety of desired information and it must be simple both in

principle and in operation. We fully expect, moreover, that the ready and immediate availability of pertinent cost information will greatly encourage and facilitate the assessment of "intangible" benefits in financial terms and will ultimately lead to a similar assessment even of the elusive "secondary benefits" as mentioned above.

The team member who concentrated on this problem was M. Kassner; his paper, "Cost Analysis for Experimental Satellite Projects" is included in this report; it deals with user-oriented costs and outlines a cost model as framework to facilitate the derivation of such costs under a wide range of conditions.

The approach he chose leads to a drastic reduction in the complexity of computation, to the point where the requisite cost calculations can be performed by individual users equipped with programmable hand-held calculators. This would seem to fulfill - rather unexpectedly - the wish expressed to us by many "experimenters" for direct and easy access to cost information as a guide to their planning and operation of their experimental satellite systems.

## Cost Analysis for Experimental Satellite Projects

### Introduction

The more traditional concept of cost analysis (as applied to "projects") is to:

- determine the economic feasibility of a project
- once launched, to monitor expenditures and to keep the project "on track"
- to summarize total costs upon completion of project

By and large, this seems to have been the procedure and practice with respect to experimental projects using the Hermes satellite.

It has become apparent, however, that it would be desirable to extend the scope of cost analysis in future operations and specifically to include cost benefit analysis. These premises represent the point of departure for the work described in this report.

### Perspective

In an attempt to see more clearly what the appropriate scope and function of cost analysis might be, a "perspective" was developed for experimental satellite systems which attempts to portray the roles and relationships of all the major parameters to be considered to optimize the effectiveness of a project.

Once established, this perspective suggested that major changes in a number of concepts are indicated if full value is to be derived from experimentation. However, this paper concentrates on the changed role of cost in the new framework and of the far-reaching consequences of this new role.

### The Role of Cost

Under the impact of this perspective, the traditional role naturally expands to include cost benefit, but it does not stop there. Cost emerges as the single

common factor - the vital link - between system configuration and its utilization. In this role the cost function becomes a powerful tool for research and exploration of new alternatives - provided of course, that cost information can be obtained with ease and speed. This report will discuss these features of the extended cost concept in its application to operational ends.

Cost Benefit Analysis

In experimental satellite systems, particularly those devoted to new types of services, (e.g. telemedicine) it is rather difficult to assign a quantifiable value to the benefit obtained. Indeed, this type of information seems to be almost completely lacking in virtually all evaluation reports of Hermès projects.

This is not altogether surprising since "traditional" cost benefit analysis finds it very difficult to cope with "intangible" values. The extended concept of cost analysis, as a powerful research tool, however, immediately suggests a possible solution.

Tangible Benefits

Where benefits are "dollar-tangible" the situation is simple: The benefits may be expressed either in terms of revenues produced or in terms of expenses saved over other alternatives considered.

Intangible Benefits

The situation changes drastically when benefits are not easily expressible in monetary terms. Here the tendency is strong to use this difficulty as an alibi for abandoning all attempts at quantifying benefits; it seems surprising how often this response to a difficult situation is allowed to go unchallenged.

Accessibility of Costs

The uncertainty regarding the monetary value of a benefit can at times be resolved in a surprisingly simple manner.

The cost of providing a service of undefined (and seemingly undefinable) value can usually be established without undue difficulty. Once this cost is conveyed to the user of that service (or anyone else intimate with the circumstances), he may experience surprisingly little difficulty in deciding whether the service is "worth it" or not. From this judgment it is only a relatively short step towards deciding on the range of costs over which the service may indeed be worth it, or under what modified circumstances the service might be worth it. Even if these decisions are not immediately forthcoming, relatively little additional research effort can usually come up with such a "ball park range".

Cost Analysis

The above considerations immediately place a stringent requirement on cost analysis: Costs, regardless of the configuration or complexity of the telecommunications system, must be easily and quickly expressible in terms of "per user" cost. (User is used here in a very broad sense.) It is precisely this requirement which must determine the concept and structure of an appropriate cost model.

the point of departure for the design of a cost model was a "general cost model", representing a consolidation of techniques used by ASDA in a large variety of situations and analytic tasks.

This model was then adapted to the specific requirements of experimental satellite systems. The "stringent requirement" of per user cost presented no serious problem since that concept is already inherent in the general model; in fact, it is a key feature of the ASDA technique.

The Cost Model

The orientation in this paper is towards operational techniques and their significance rather than towards technical details of design. It seems appropriate, however, to outline briefly the basic concepts of the method employed.

The heart of the model is a basic cost matrix which contains the following cost factors in its rows and columns:

- investment, operation and programming costs for satellite, earth station(s) and receiver terminals

Any satellite system can thus be described in terms of the above cost components and additionally in terms of hours of operation and number of "beneficiaries", (i.e. end users).

Cost information derived from the above input data may be expressed as "straight" or per user costs over a stipulated time period. In can be given for each component of the system (satellite, ground station, receiver terminal), and for the total system. The cost of each component can, moreover, be expressed as a percentage of total cost. Normally, these values will be presented as a printout of a computer program.

Computer Program

The essentially modular arrangement of cost input data, coupled with a judicious selection of other input parameters and a similarly modular arrangement of derived costs, results in a remarkably simple computer program.

The resulting program is, in fact, so concise that it can be accommodated on a programmable pocket calculator - with room to spare.

Thus, the scope of the model can be extended by providing for a choice of annual interest rates (applicable to capital costs) and cost excalation rates (applicable to operational costs).

To increase the scope and utility of the analytical tool still further, a capability for aggregating specific programs or program groups (i.e. entire "experiments") can be accommodated.

The preliminary design of a prototype program has been carried to the stage where the feasibility of providing all the above features is established beyond any doubt.

Application

Several variants of the prototype program just described are possible; these variations differ mainly in the arrangement of input data to further simplify operation for specific applications. Any of these designs can readily be developed into fully operational computer programs, either for "standard" computers or for the "pocket" version.

The analytical technique could initially be applied to obtain the "cost benefit" data (i.e. per user costs) hitherto missing from evaluation reports of Hermès projects, and thereby augment their information content and value. This procedure would not only provide information of considerable importance for the planning of ANIK B experiments, but would also serve to hone the cost analysis technique to the point where it can be used as an active monitoring device (rather than a post mortem instrument) during ANIK B experimentation.

Implication

The availability of a full cost analysis program for (programmable) pocket calculators promises to add an entirely new dimension for this analytical tool. No longer need data be sent to a central place where the appropriate computations are performed by specialists and results returned with valuable loss of time and perhaps intelligibility.

A new capability for evaluating and understanding his operation from a cost point of view - virtually instantaneously - can now be literally placed in the hands of each experimenter. (The operation of the program is only marginally more complicated than the familiar manipulations of the pocket calculator.) At the same time the experimenter can be given the capability to compare his (planned or actual) operational cost figures with those corresponding to a commercial-type operation. (The qualitative distinction between commercial and experimental operation is expressed as a mere quantitative adjustment of the values in the input data of the cost matrix.)

An important spin-off would result from individual experimenter access to "pocket computers". The provision of appropriate programs to each experimenter would guarantee identical formats for all financial statements, (i.e. initial plan, revision(s), periodic statements, final statement) from each and every experimenter, with a minimum effort (or financial expertise) on his part. Cost data of uniform format would simplify not only the ease of their interpretation but would simplify their consolidation by DOC. (In fact, fast and virtually error-free consolidation could be achieved via magnetic cards from each "field computer" - quite an improvement over typed financial statements of reports.)

Conclusion

What has been described is in essence a new (modular) cost analysis technique which combines remarkable intrinsic flexibility with unusually simple computation procedures. The latter feature permits the use of (programmable) pocket calculators to cope with all necessary calculations. The application of this technique to operational planning and monitoring has also been described.

It would seem fair to say that DOC's stated expectations for "cost benefit analysis" can be exceeded by a substantial margin through the approach suggested here.

It would further appear, on the basis of a comprehensive "perspective" developed as a prelude to this work on cost analysis and models, that essentially the same technique could be used additionally as a powerful tool for research, exploration and development of new modes of utilization of the satellite facility.

Needs/Cost Relationships

In an attempt to identify "services which appear to have the highest value commensurate with their costs", once per user costs have been obtained, we would like to introduce some "rules of thumb" to aid the selection of those services which show high pay-off in relation to cost. Pierre Pérusse was primarily responsible for these.

Before making any form of selection, it is assumed that a thorough need analysis has been conducted (see ST Development Model under Objective 4) and that user needs have been clearly and unambiguously identified. Having carried out this first step, one may apply the rules of thumb identified in the following tables.

TABLE 5 - NEEDS/COST RELATIONSHIP

| IF THE IDENTIFIED NEED* IS PERCEIVED BY THE.... | AS | THE SERVICE IS |
|---|---|---|
| Dispensers and primary beneficiaries (e.g. teachers/doctors receiving in-service training | > the cost in $ | offered |
| | < the cost in $ | not offered |
| | = the cost in $ | offered if no less expensive delivery system can be found |
| | AND | |
| Secondary or ultimate beneficiaries (e.g. students/patients who ultimately reap benefits) | > the cost in $ | offered |
| | < the cost in $ | offered (but is viewed as a long-term investment) |
| | = the cost in $ | offered |

*N.B. Critical is the accurate assessment and identification of needs.

TABLE 6 - SERVICES PRIORITIES/COSTS

| SERVICE | PRIORITY | DELIVERY OF SERVICE |
|---|---|---|
| Emergency (e.g. Atomic threat; flood; epidemic) | 1 | at any cost |
| Necessity (must have) (e.g. Primary health care; literacy) | 2 | at any reasonable cost |
| Good to have (e.g. In-service training; community health training; council debates) | 3 | if cost can be justified |
| Eventually should have (e.g. Sports events between communities; exchange of lore/skills) | 4 | if the cost is economical |

In addition, the following factors should be taken into consideration before offering a service:

1. Are there sufficient resources, both human and non-human, to ensure the success of the service?

2. Are there sufficient existing trained personnel to launch the service or will training have to be carried out prior to offering the service?

3. Are there sufficient funds available to initiate and then maintain the service?

4. Have studies been undertaken to assess user reaction to the service to-be-offered? Is any sort of backlash to be anticipated? Will undesirable needs or habits be created?

5. Will withdrawal of the service, after funding ends, create disruption and excessive disappointment or even hardship?

6. Can the service to be provided be integrated into an aggregation of services so that it can draw on existing expertise, capital investments and/or even user groups?

7. How much software development is required? Can the service make use of existing materials?

Summary for Objective 3

The team experienced great difficulty in assessing satellite delivered services in objective economic terms. In an attempt to analyze this difficulty we identified the following as major factors

- o inadequacy of cost data base in explicit terms
- o virtual absence of adequate methodology for determining operational costs
- o and specifically for relating and comparing experimental - and commercial-type modes of operation
- o and for aggregating a number of services of similar or dissimilar type
- o specific difficulty in quantizing "intangible benefits"

This situation is reflected in a considerable number of documents (and particularly in Hermès evaluation reports) which we examined in the course of this study. While some investigators identified specific cost factors for consideration and recall some economic ratios of significance, no comprehensive treatment of the problem appears with sufficient clarity to form the basis for comprehensive analysis.

We lay no claim to being the first to identify the root cause of this situation and suggesting a remedy; it has been stated before: "For long range planning optimization... a simplified approach to cost is needed." (Casey and Palmer, 1977)

In full agreement with this statement, we set out deliberately in search of precisely such a "simplified approach". The outcome of this effort exceeded our boldest expectations: The "new approach" is so simple in concept and implementation that meaningful cost analysis can be performed by individual experimenters, equipped with hand-held programmable calculators.

We believe that we have thus taken the first, modest but vital, step towards a full and comprehensive economic analysis of experimental satellite systems.

OBJECTIVE 4: Identify plausible plans of action and working models (projections) which could be the basis for DOC initiatives to improve the level of satellite-based public services available to Canadians, concentrating on the two priority services described in section 4.

The two priority services referred to in section 4 are education and health care. Our investigations, including discussions with DOC representatives and satellite project participants as well as an examination of project reports, have led us to the conclusion that project teams in these two areas urgently require models which they can utilize to guide the planning, carrying out and evaluation of their satellite projects. Two types of models appear to be most in demand:

1. A model set of guidelines for systematically planning, developing, and monitoring all phases of a project. The model must be relatively simple to understand, viz. no technical jargon, yet comprehensive. Means for projecting and monitoring costs should be included along with, if possible, some readily applicable accounting procedure.

2. A model for integrating simulation into project preparation to avoid costly transmission errors, train and rehearse teams and explore alternative solutions to diverse satellite project problems. As with the development model, the simulation guidelines and procedures should not require knowledge and skills beyond those already present within a project team.

To meet these priority requirements, one of the team members, Harold Stolovitch, in collaboration with Sivasailam Thiagarajan, prepared two working models which are presented integrally below. The first of these, Satellite Technology (ST) Development Model, offers a systematic set of guidelines for preparing and developing a telecommunications satellite project for either education or health care.

The second essay/model by Stolovitch and Thiagarajan deals with Simulation in Satellite Projects: Planning, Testing, and Preparing for Transmission. It is intended for use by satellite project teams in education and health and avoids using language and concepts unfamiliar to these target populations. It concludes with a rule of thumb for determining how much simulation a project team should get involved in.

## Satellite Technology (ST) Development Model

The success of any satellite project depends in large measure on the systematic care with which it has been planned. This document offers potential satellite users a step-by-step model for planning and carrying out a satellite project. There are several points to bear in mind as you use this material.

1. Satellite projects come in all sizes and levels of complexity. The guidelines that you will find here are set out for a large scale project and are fairly comprehensive. You will have to discriminate and tailor requirements and procedures to fit your particular situation.

2. Because this model is designed to cover most types of satellite projects in the education and health-fields, it may be missing components that your specific project requires. Once again we suggest adding your own insights to the document to make it more usable.

3. The model, in keeping with suggestions from the Department of Communications, suggests that all possible communications avenues - earth-based, micro-wave, even postal - be considered in addition to or as a replacement for satellite communication. Only when satellites offer benefits unobtainable from other less expensive systems should they be considered as the solution.

   Satellite technology provides a unique means of linking persons and places that have hitherto remained apart. The purpose of encouraging individuals and institutions to undertake satellite projects on an experimental basis is to explore all possible avenues of exploitation in the educations and health fields. And this document is aimed at ensuring that the maximum benefits are obtained from your efforts.

## Intended Users

This document is produced for three types of readers. These readers and the purposes for which they might use this document include the following:

- Health and educational professionals who are interested in the application of satellite technology to their fields. They may use this document for preparing a proposal to DOC or other funding agencies for conducting a satellite technology project.
- Project directors and team members of a funded project which is engaged in a satellite technology project in medicine or education. They may use this document for preparing a plan that would provide specific guidelines for conducting the project.

- Reviewers in funding agencies which have the task of sponsoring cost-effective projects. They may use this document for evaluating the comprehensiveness of different proposals.

Goals and Objectives

As suggested above, the goal for this document is to enable project directors and their teams to produce a detailed plan on how to successfully conduct the various phases and steps of the project. In more specific terms, the objectives for this document are the following:

- To systematically analyze the need for the project, the characteristics of the users who are to benefit from it, and the context in which the project is to be undertaken.

- To specify the procedures to be used in the analysis, design, production, evaluation and implementation of the proposed system which utilizes satellite technology.

- To realistically estimate and specify the time requirements for various steps of the project.

- To itemize the various costs associated with each step of the project and to prepare a realistic, comprehensive budget.

An Overview of the (ST) Development Model

The following information sheets are arranged in step-by-step fashion to guide you through the planning and monitoring of your project. Using these sheets you can readily develop both a project proposal and a planning document. The information sheets are grouped into six clusters:

Analysis: The first four information sheets deal with needs analysis, priority referencing, user analysis and context analysis. These analysis materials assist you in obtaining evidence of a need for the project and then guide you in demonstrating how your project meets both field and DOC priorities, those who will be affected by it and under what conditions the project will take place. At the end of the analysis cluster, you will have the information necessary to justify the project as well as the data base for setting goals and initiating the design.

Design: The five information sheets in the design cluster detail the major steps of goal setting, system selection, setting criteria, specifying analysis procedures and specifying design procedures. These sheets help you set your project's goals and objectives, select the most suitable telecommunications system for meeting the objectives - satellite, other or a combination of several -, specify criteria for evaluating the success of the project, and finally establishing the procedures for fine tuning your analyses in terms of the selected system, and designing the strategies, methods and materials for the proposed project.

Production: Although this is only one information sheet, it is a critical one in that it outlines what procedures you will have to specify for the actual creation of the prototype materials and final products that your project requires. A large portion of your project's resources are consumed in this phase.

Evaluation: Three information sheets focus on evaluation: specifying formative evaluation procedures, specifying summative evaluation procedures, and cost-benefit analysis. These sheets are designed to help you design procedures for improving all components of the project, assessing its impact, its successes and failures, and identifying and demonstrating what benefits have accrued in relation to the costs.

Implementation: The implementation information sheet assists you in detailing how you intend to get the system out into the field. The procedures you derive will cover the installation, implementation and institutionalization of what you are proposing.

Timelines and budgets: The final two information sheets provide step-by-step suggestions for establishing timelines and budget requirements and then monitoring these throughout the life of the project. Budgeting, in particular, has often been cited as a major problem area - both in terms of preparing budgets and then later in monitoring them. It is essential that all possible costs be determined in advance and then strictly controlled. The budgeting information sheet can assist with this effort.

## 1. NEEDS ANALYSIS

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OBJECTIVE: To identify high-priority problem areas.

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MATERIALS: Surveys, studies, government reports, and statistics related to the problem area. Final reports from previous, similar projects.

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PROCEDURE:

- Assemble a panel of experts and people affected by the potential problem area. Also collect available documents related to that area.
- Jointly identify the ideal state of affairs in the specific problem area. Define this state of affairs in specific terms.
- Describe the existing state of affairs in specific terms that parallel those used for the ideal state.
- Identify the discrepancies between the ideal and the existing states of affairs. The magnitude of your problem depends on the size of this discrepancy.
- Generate a list of possible causes for these discrepancies with supporting evidence for each cause.
- List the problem areas in order of priority along with the probable causes for each.

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## 1. NEEDS ANALYSIS (Cont'd)

SUGGESTIONS:
1. Make sure that your needs analysis has not already been done by someone else.
2. Secure and distribute materials with background information before face-to-face meetings.
3. Provide objective evidence for ideal and existing states and the probable causes for discrepancies.

ADDITIONAL PERSONNEL: Consultants in the problem area, representatives from the problem area, and technical advisors.

ADDITIONAL COSTS: Payments to consultants, their travel and transportation, per diem, boarding and lodging, business meals, meeting space rental, acquisition of relevant documents.

## 2. PRIORITY REFERENCING

OBJECTIVE: To match needs identified in the previous analysis with priorities established for funding satellite technology projects.

MATERIALS: List of priority problem areas from the previous step. DOC publications, especially the Project Guidelines. Reports that list priority needs in the selected area of medicine or education.

PROCEDURE:
- Locate documents in the field that confirm your needs as priority concerns.
- Examine DOC documents to match your needs with the departmental priorities.
- Link these priority statements with your problem statements from the previous step.

SUGGESTIONS:
1. Make sure that your identified needs fit <u>both</u> priorities in your field and the priorities of DOC.
2. Make this match between your needs and external priorities very clear to others.

ADDITIONAL PERSONNEL: Reference librarian, representatives from government departments, and consultants in the selected areas.

## 2. PRIORITY REFERENCING (Cont'd)

ADDITIONAL COSTS: Payments to consultants, their travel and transportation, per diem, boarding and lodging, acquisition of documents, library data bank searches.

## 3. USER ANALYSIS

OBJECTIVE: To identify different user groups and their characteristics which are relevant to the project.

MATERIALS: Publications with information on various user groups. Tests and questionnaires (both commercial and locally-designed) for collecting information on user characteristics.

PROCEDURE:

- Identify all potential persons affected by the project and divide them into user groups.
- List various characteristics of users (e.g. attitudes, language, socio-economic status, etc.) which are relevant to the project.
- Describe each user group category in terms of these characteristics. Collect additional information if necessary.
- Specify the roles and interactions among various user groups during your project.

SUGGESTIONS: Make sure that you compile as complete a list of users as possible. For example, if your project involves some instruction, in addition to the learners, you may want to list instructors, quest panelists, and other experts as users. Similarly, if a project involves medical diagnosis through satellite transmission, then the patients, nurses, doctors and external experts can all be considered as users.

ADDITIONAL PERSONNEL: Consultants on user characteristics. Part-time interviewers and test scorers. Representatives from different groups.

ADDITIONAL COSTS: Payments to all additional personnel listed above, their travel, transportation, per diem, boarding and lodging.

## 4. CONTEXT ANALYSIS

OBJECTIVE: To identify relevant characteristics of the context in which the project is conducted.

MATERIALS: Publications describing the various contexts. These may include descriptions of your institution, geographical surveys, sociological and anthropological reports, technical reports on relevant communications networks, personnel lists, job specifications and inventories of equipment.

PROCEDURE:

- Describe your institution in terms of those characteristics which affect the project (e.g. physical environment, degree of administrative commitment to the project, availability of secretarial and computer services, and previous experience of similar projects).
- Describe the technological context in terms of those characteristics of the larger community that affect the project (e.g. types of equipment already installed, sophistication of users, technical knowledge, studio/broadcast facilities and communications networks).
- Describe the geographical context (e.g. location and dispersion of user groups, climate, access to technological resources, distance between sites and topography).
- Describe the socio-cultural context of the project (e.g. levels of education, ethnicity, language and cultural problems).
- From the descriptive information draw up a profile of the total context in which the project is to be conducted.

SUGGESTIONS:

1. Use a wide variety of objective sources of information to avoid any biases.
2. Limit the descriptions to those characteristics that are relevant to the project.
3. Keep the context analysis and the user analysis parallel to each other.

ADDITIONAL PERSONNEL: Various consultants in different context areas.

ADDITIONAL COSTS: Payments to consultants, their travel, transportation, per diem, boarding and lodging. Cost of different publications.

## 5. GOAL SETTING

OBJECTIVE: To clearly state the goals and objectives for the project on the basis of information from the previous analyses.

MATERIALS: Problem statements, priority statements, descriptions of user group characteristics, and descriptions of the context from the previous steps.

PROCEDURE:

- State the general goal for the project in terms of a solution to the problem identified during needs analysis.
- List specific objectives which directly contribute to the achievement of this goal.
- Eliminate those objectives which are not compatible with the outcomes of your analysis.
- Provide copies of the goals and objectives (along with various analysis reports) to a panel of experts, representative users and others for feedback.
- Revise your goal and objectives on the basis of the feedback.
- Justify the goal and each objective by providing supporting evidence from your analyses.

SUGGESTIONS:

1. State your goal in clear and straightforward language and your objectives in concrete, measurable terms.
2. Be realistic in setting your goals. Do not bite off more than you can chew.

ADDITIONAL PERSONNEL: Expert consultants and representative users.

ADDITIONAL COSTS: Payments to all additional personnel listed above, their travel, transportion, per diem, boarding and lodging.

## 6. SYSTEM SELECTION

OBJECTIVE: To select the appropriate telecommunication system which will best meet the project needs at the least cost.

## 6. SYSTEM SELECTION (Cont'd)

MATERIALS: Goals, objectives, and results of earlier analyses. Reports of similar previous projects. Information on available telecommunication systems. Tables and figures indicating costs of each system and different parts of the system.

PROCEDURE:

- List requirements for the telecommunication system on the basis of the project goals and objectives, user characteristics, and the technological, socio-cultural, geographical and institutional context of the project.
- Make a list of available telecommunication systems (e.g. satellite systems, microwave systems, land-based systems) in terms of their components (e.g. television, telephone and computers) and alternative formats (e.g. slow scan, wireless).
- Compare the relative cost-effectiveness of different components in meeting the requirements for your system.
- Select the system (or a combination of components from different systems) that best meets the project needs at the least cost.

SUGGESTIONS:

1. Some systems may be currently available for experimental use at little or no expense. However, bear in mind future costs when selecting the most cost-beneficial system.
2. Government agencies are attempting to reduce medical and educational costs. The selection of your system should demonstrate significant benefits for any additional costs.

ADDITIONAL PERSONNEL: Communications consultants, consultants from DOC, and other technical consultants. Cost-benefit analyst, computer programmer.

ADDITIONAL COSTS: Payments to consultants, their travel, transportion, per diem, boarding and lodging. Cost of different publications. Cost of computer time and programming.

## 7. SETTING CRITERIA

OBJECTIVE: To specify criteria which will indicate whether or not the goals and objectives of the project have been achieved.

MATERIALS: Goals and objectives, information collected during earlier analyses, and the description of your system.

PROCEDURE:

- For each objective, identify a set of indicators and measurement instruments that will test whether or not it has been achieved.
- For each objective, list some secondary effects and identify indicators for measuring them. (For example, the secondary effect of a nurse-training program could be fewer complaints from patients.)
- Set up the technical quality control criteria for each part of your system. Prepare checklists or evaluation instruments for measuring them. (For example, if television is one of the components of your system, you may set up criteria for picture quality and audio reception).
- Set up non-technical quality control criteria for such variables as reliability, convenience, flexibility and confidentiality of your system.
- Identify all cost factors (e.g. time, personnel, materials, repairs, replacements etc.) and set up procedures for collecting and recording data related to them.

SUGGESTIONS:

1. Make sure that your criteria perfectly match your objectives.
2. Use a wide variety of indicators for all measures.
3. Make sure that your technical and non-technical quality control criteria are measurable ones which can be easily monitored during the project.

ADDITIONAL PERSONNEL: Tests and measurements, technical and accounting consultants.

ADDITIONAL COSTS: Payments to all additional personnel listed above, their travel, transportion, per diem, boarding and lodging.

## 8. SPECIFYING ANALYSIS PROCEDURES

OBJECTIVE: To specify the procedures for fine grain analysis for producing project materials and designing/selecting methods.

MATERIALS: Reports from earlier analyses and materials used in these earlier steps.

PROCEDURE:

- Re-examine your problem statements from the analyses in the light of your proposed system. Fine tune the analyses to provide specific information on the needs related to your solution.
- Re-examine the user-group descriptions from the point of view of the proposed system. Collect more detailed information related to the design and use of the system.
- Re-examine your technological, institutional, socio-cultural and geographical context from the point of view of the proposed system. Collect more detailed information about all these contexts related to the design and use of the proposed system.
- Break down the project goals and objectives into tasks and subtasks on the basis of the information collected above.

SUGGESTIONS: 1. This is a statement of the earlier analyses and not a new step. Do not start the process all over again. This analysis phase helps you zero in on your ultimate content and user group.

ADDITIONAL PERSONNEL: Expert consultants in the problem area, content area and instructional analysis.

ADDITIONAL COSTS: Payments to all additional personnel listed above, their travel, transportion, per diem, boarding and lodging.

## 9. SPECIFYING DESIGN PROCEDURES

OBJECTIVE: To specify procedures for the design of your system.

MATERIALS: Outcomes from the previous step.

## 9. SPECIFYING DESIGN PROCEDURES (Cont'd)

PROCEDURE:
- Based on your analyses, set up goals and objectives for your system.
- Select suitable strategies (e.g. training, diagnostic centers, simulation etc.) to accomplish your goals and objectives.
- Select suitable media and formats (e.g. television, audio, print etc.) to accomplish your goals and objectives.
- Prepare a "blueprint" for the design of the system.

SUGGESTIONS:
1. The goals and objectives in this step are more specific than the earlier ones. They relate to the system you are designing rather than to the project as a whole.
2. Models for the systematic selection of strategies, media and format exist in the literature. Make use of them wherever appropriate.
3. The blueprint should be a detailed document outlining both the materials and methods to be created.
4. This is a suitable phase to begin early formative evaluation (step 11).

ADDITIONAL PERSONNEL: Instructional designers, media production specialists, script writers, content specialists and other consultants.

ADDITIONAL COSTS: Payments to all additional personnel listed above, their travel, transportion, per diem, boarding and lodging.

## 10. SPECIFYING PRODUCTION PROCEDURES

OBJECTIVE: To specify procedures for the production of your system.

MATERIALS: The blueprint from the previous step.

## 10. SPECIFYING PRODUCTION PROCEDURES (Cont'd)

PROCEDURE:
- Assign production responsibilities to different in-house personnel and/or outside contractors.
- Allocate suitable resources to different producers and set up production schedules (with intermediate deadlines).
- Produce various components of the system with quality control checkpoints.
- Check compatibility of your system components with the requirement of the transmission system.
- Assemble various components into an integrated prototype system.
- On the basis of formative evaluation data (see next step) produce the final system.

SUGGESTIONS:
1. Production can become the biggest consumer of your time and resources. Strict time and budget controls are essential in this step.
2. Formative evaluation procedures should be instituted very early in the production phase to reduce the cost of (and resistance to) chance.
3. Particularly with mediated components, producers have a tendency to stress attractiveness over effectiveness. These should be kept in balance.

ADDITIONAL PERSONNEL: Outside contractors for production, part-time technical consultants, actors, narrators and miscellaneous talent.

ADDITIONAL COSTS: Production materials, production equipment, user equipment, transmission costs, studio time, printing, graphics, publication and reproduction costs, and payments and expenses related to all the additional personnel.

## 11. SPECIFYING FORMATIVE EVALUATION PROCEDURES

OBJECTIVE: To specify procedures for improving project methods and materials on the basis of feedback from experts and representative users.

## 11. SPECIFYING FORMATIVE EVALUATION PROCEDURES (Cont'd)

MATERIALS: Project materials (e.g. training manuals, videotape and descriptions of procedures). Lists of goals and objectives, analyses data, time lines, criteria and various tests and measuring instruments.

PROCEDURE:

- Assemble a panel of experts from different fields and provide them with prototype products and procedures. Have them review materials and provide feedback for improvement using background information and guidelines which you supply to them.
- Analyze suggestions from different experts and select a set of improvements to be made. Implement these changes in your products and procedures.
- Simulate project procedures (see suggestions for simulations in the accompanying paper). Monitor activities and revise accordingly.
- Pilot the products and procedures with representative user groups. Monitor the use and collect feedback on effectiveness and efficiency. Make suitable revisions.
- After implementation, constantly collect relevant information to update and streamline the project materials and methods.

SUGGESTIONS:

1. Be sure to allocate appropriate time periods for evaluation and improvements within your timelines.
2. Institute evaluation procedures as early in the project as possible, since changes become more expensive and resistance to change increases the further you get into the project.
3. Use a wide variety of experts and limit each expert to his/her particular speciality.
4. Do not collect data for data's sake. Make sure all information is useful for improving your project.

ADDITIONAL PERSONNEL: Different expert consultants. Representative users. Technical part-time help (e.g. media production people). Additional communications engineers. Additional evaluators.

ADDITIONAL COSTS: Production materials, production equipment, user equipment, transmission costs, studio time, printing, graphics, publication and reproduction costs, and payments and expenses related to all the additional personnel.

## 12. SPECIFYING SUMMATIVE EVALUATION PROCEDURES

OBJECTIVE: To specify procedures for evaluating the final outcomes of the project and to make recommendations for the follow up.

MATERIALS: All products and procedures from the project. Different tests and measuring instruments. Evaluation data gathered throughout the project, including project logs and anecdotal reports.

PROCEDURE:

- Prepare a suitable summative evaluation design.
- Acquire or design all additional tests and measuring instruments for collecting input, output and process data.
- Work out specific procedures for carrying out the evaluation and data analysis.
- Select suitable subjects from user groups whom you will use in your evaluation.
- Implement the evaluation plan, analyze the data, and draw conclusions that are directly related to the data.
- Write the final report with suitable recommendations which are directly related to the data.
- Write the final report with suitable recommendations which are directly related to your conclusions.

SUGGESTIONS:

1. Make sure that your study is comprehensive without being constraining. You need to identify your achievements as well as your failures through comprehensive testing. However, you should avoid overcollection of data which can negatively affect the project outcomes.
2. In your final report, be as objective and candid as possible. Most project reports do not include valuable information because they are considered "unrespectable" (e.g. personality conflicts within your team or the high quality of dedication among the workers).
3. Report your findings without the use of excessive jargon, so that others can understand and build upon your experience.

ADDITIONAL PERSONNEL: Evaluation consultants. Representatives from user groups. Part-time data collectors and analysts. Computer programmers.

ADDITIONAL COSTS: Costs of additional personnel. Costs of designing tests and duplicating them. Computer time for scoring and data analysis. Transmission and reception costs.

## 13. SPECIFYING COST BENEFIT ANALYSIS PROCEDURES

OBJECTIVE: To specify procedures for identifying and demonstrating cost savings through the use of your system to achieve the benefits of the project.

MATERIALS: List of goals and objectives for the project, evaluation data on the effects of the project, budget and detailed cost accounts for the project.

PROCEDURE:

- List major benefits of the project under various categories. Use both the goals and objectives of the project and the actual evaluation data.
- For each benefit, record the cost of attaining it with your system. The costs should be reduced to dollar figures whenever feasible.
- List two or three alternative systems which are available for achieving the same benefits. Find out the corresponding costs for obtaining the same benefits at the same level. You should obtain these cost estimates from a comparable project using the alternative system. If such cost figures are not available, you may have to use data from previous years to estimate them. If one of your alternative systems is so innovative that it is not yet being used anywhere, you may have to estimate the best available costs.
- Compare different costs for obtaining different benefits and the total package of benefits. Identify the most cost-effective system. If you have systematically selected a worthwhile project that utilizes the unique capacities of satellite technology, it is hoped that your system has the best cost-benefit figures. Even if this does not turn out to be the case, the data may suggest valuable new combinations.

SUGGESTIONS:

1. Objectivity is of critical importance in your cost-benefit analysis. It will be a good idea to contract with an outside agency to undertake this step of your project.
2. Be realistic about the achievements and benefits of your project. Do not permit wishful thinking to equate the goals and objectives of the project with the actual benefits.

ADDITIONAL PERSONNEL: Outside evaluators. Cost-accounting consultants.

ADDITIONAL COSTS: Payments to consultants, their travel, transportation, per diem boarding and lodging.

## 14. SPECIFYING IMPLEMENTATION PROCEDURES

OBJECTIVE: To specify procedures for implementing your system in the field.

MATERIALS: All components of your system.

PROCEDURE:

- Select suitable sites and establish contact with local liaison.
- Cooperatively determine installation requirements in terms of equipment, transmission links, technical expertise, personnel, space, time and support systems. Also determine implementation constraints (e.g. geographic, linguistic).
- Work out a budget and a schedule for the implementation at each site.
- Design a strategy for implementation (e.g. introduction, training, maintenance) and verify its feasibility at each site. Simulate this strategy implementation to debug the procedures.
- Install your system at different sites and monitor its use. Provide all necessary assistance and modifications.

SUGGESTIONS:

1. Even though this is the final step, planning for implementation should begin very early.
2. Do not rely solely on experts' judgments; involve user-groups in the design of the implementation strategy.
3. Prepare contingency plans for various probably technical difficulties, (e.g. audio link back-up system in case of audio-visual transmission problems.)
4. Establish alternate schedules in case of unanticipated delays.

ADDITIONAL PERSONNEL: Consultants from previous similar projects, on-site coordinators, part-time technical help for installation crews. Local technical personnel. Troubleshooter/ itinerant consultant.

ADDITIONAL COSTS: Payments to all additional personnel listed above, their travel, transportation, per diem, boarding and loding. Materials and equipment costs. Installation costs. Antenna costs. Communications hookups. Reception equipment. Transmission equipment. Studio time.

## 15. TIMELINE DESIGN

OBJECTIVE: Specify the start and termination dates for each phase and step of the project.

MATERIALS: Project procedures from the previous steps. Total list of project personnel and consultants with their schedule availability.

PROCEDURE:

- Using the project procedure descriptions, list major phases and individual steps.
- Determine the final deadline date for the termination of the entire project.
- Working backwards, tentatively determine the number of days required for each phase. Also, determine which phases/steps can be accomplished simultaneously.
- Determine starting and ending dates for each phase and activity.
- Graphically lay these out on a time line sheet (with phases/steps along the vertical axis and time along the horizontal). Adjust individual time allocations so that they fall within the time constraints of the project.

ADDITIONAL PERSONNEL: Time-management and PERT/CPM consultants. Consultants from other projects. Computer programmer.

ADDITIONAL COSTS: Payments to all additional personnel listed above, their travel, transportation, per diem, boarding and loding.

## 16. BUDGETING

OBJECTIVE: To prepare a comprehensive, itemized budget for the project.

MATERIALS: Your planning document and sample budgets from similar project.

## 16. BUDGETING (Cont'd)

PROCEDURE:

- Determine cost categories based on the samples given in Appendix I. You may also want to examine budget items from other similar projects.
- Design a table with the phases and steps of the project (from your time line) along the vertical axis and cost categories along the horizontal. Enter itemized costs for each phase/step and each category.
- For each cell of your table, indicate the amount of institutional support and the amount required from outside sources.
- Total up the vertical columns so that three figures are shown for each cost category: total amount required, the amount of institutional support, and external funding required. Prepare a summary budget showing all three categories.

SUGGESTIONS:

1. Prepare three budgets: a realistic one, an absolute minimum budget and an affluent budget. Depending upon the predisposition of the funding agency and your project team, use the appropriate one.
2. Be prepared to negotiate with the funding agency (and with your institution) on all categories. Have justification data for each budget entry.

ADDITIONAL PERSONNEL: Consultants.

ADDITIONAL COSTS: Payments to consultants, their travel, transportation, per diem, boarding and lodging.

# APPENDIX I

## ITEMIZED CATEGORIES FOR A SAMPLE BUDGET

| ITEM | PROJECT REQUIREMENTS | INSTITUTIONAL SUPPORT | AMOUNT REQUESTED |
|---|---|---|---|
| PERSONNEL | | | |
| - Full-time project staff | | | |
| Salaries | | | |
| Administrative | | | |
| Content (medical/educational) | | | |
| Developmental | | | |
| Technical | | | |
| Evaluation | | | |
| Transmission | | | |
| Production | | | |
| Secretarial | | | |
| Computer | | | |
| Benefits for all of the above | | | |
| - Part-time staff | | | |
| Salaries | | | |
| Administrative | | | |
| Content (medical/educational) | | | |
| Technical | | | |
| Developmental | | | |
| Production | | | |
| Transmission | | | |
| Evaluation | | | |
| Secretarial | | | |
| Computer | | | |
| Benefits for all part-time staff. | | | |

| ITEM | PROJECT REQUIREMENTS | INSTITUTIONAL SUPPORT | AMOUNT REQUESTED |
|---|---|---|---|
| - Contractors | | | |
| Technical | | | |
| Developmental | | | |
| Production | | | |
| Transmission | | | |
| Evaluation | | | |
| Computer | | | |
| - Consultants | | | |
| Content (medical/educational) | | | |
| Technical | | | |
| Developmental | | | |
| Production | | | |
| Transmission | | | |
| Evaluation | | | |
| Computer | | | |
| - Representative users | | | |
| For Analysis | | | |
| For Evaluation | | | |
| TRAVEL AND TRANSPORTATION | | | |
| Project Team | | | |
| Part-time workers | | | |
| Contractors | | | |
| Consultants | | | |
| Representative users | | | |

| ITEM | PROJECT REQUIREMENTS | INSTITUTIONAL SUPPORT | AMOUNT REQUESTED |
|---|---|---|---|
| PER DIEM | | | |
| MISCELLANEOUS MEALS AND RECEPTION CHARGES | | | |
| EQUIPMENT | | | |
| - Purchase | | | |
| Medical/educational equipment | | | |
| Production equipment | | | |
| Transmission equipment | | | |
| Reception equipment | | | |
| Office equipment and furniture | | | |
| Data processing equipment | | | |
| - Rental | | | |
| Medical/education equipment | | | |
| Production equipment | | | |
| Transmission equipment | | | |
| Reception equipment | | | |
| Office equipment and furniture | | | |
| Data processing equipment | | | |
| EQUIPMENT INSTALLATION EXPENSES | | | |
| - Supplies | | | |
| Medical/education supplies | | | |
| Production supplies | | | |
| Office supplies | | | |
| Data processing supplies | | | |

| ITEM | PROJECT REQUIREMENTS | INSTITUTIONAL SUPPORT | AMOUNT REQUESTED |
|---|---|---|---|
| COMMUNICATIONS | | | |
| Postage | | | |
| Telephone | | | |
| COMPUTER TIME | | | |
| PRODUCTION AND REPRODUCTION COSTS | | | |
| Photocopying | | | |
| Print | | | |
| Audio | | | |
| Video | | | |
| Other media | | | |
| TRANSMISSION COSTS | | | |
| INDIRECT COSTS | | | |

## Simulation in Satellite Projects: Planning, Testing and Preparing for Transmission

Many satellite projects can attribute their initial transmission problems to two major causes:

1. Lack of preparation and rehearsal.

2. Technical difficulties.

To a large extent, you can avoid both these types of pitfalls through the use of simulation. Communicating across thousands of miles instantaneously via satellite is a complex process. You usually have to deal directly with large numbers of people. You often have to use studios or facilities that have been especially set up for your transmissions. In many cases, you work with technical people whose tasks and skills are unfamiliar to you, your staff and the users of your programs. You may also have to link up additional equipment with the transmission system.

Your project can readily run into trouble when no provisions have been made for rehearsal and the experiencing of some of the difficulties you may encounter during actual transmission and reception. Fortunately, however, through the use of simulation techniques, you can begin trouble-shooting early, permitting you to meet your initial transmissions with confidence and a set of debugged procedures.

### Some Advantages of Simulation

Simulation offers some unique advantages throughout all stages of your project.

- Getting the big picture early. At the beginning of a project, your team spends most of its time working on disjointed components. Parts are assigned to individuals with the hope that all of these will ultimately fit together. A simulation in these early stages is useful for bringing different members of the planning team together to give them a feel for what the final transmission stages will be like.

- Manipulating project variables without excessive delay or expense. By simulating the final activities of the project early, you can approximate what the parts will eventually look like and how they should all fit together. You can run through planned procedures in a variety of ways. A simulation permits you to try out alternative solutions for impact and/or efficiency. On the basis of your simulation, you can select from among alternatives with greater accuracy.

- Locating missing elements. Experts are often brought together during the project to determine how the system is to function. Since this is generally a "think tank" type of procedure, some critical elements may be forgotten or overlooked. Plans and procedures are seldom operationalized at this stage. By organizing this armchair planning around simulated scenarios that focus on how the parts fit together, omissions immediately become saliently evident.

- Strengthening realistic planning. Plans that look good on paper sometimes become inapplicable in reality. One way of testing plans and procedures to verify how realistically they can be applied is through the use of a simulation which forces participants to engage in the planned activities. Observation followed by debriefing after the simulation can assist in determining which tasks are too difficult or even impossible to perform.

- Increasing enthusiasm while decreasing anxiety. Two characteristics of large satellite projects are anxiety and boredom. Faced with putting all the pieces together, depending on a complex and unfamiliar communication system and anticipating conversation with people hundreds or even thousands of miles away creates tensions, uncertainties and fears. At the same time, gearing up for transmission can be such a long and tedious process that project personnel may lose their enthusiasm because of the seeming routineness of their tasks. Simulation can help overcome both these tendencies by allowing team members to participate in activities that give them more than just a glimpse of what the real thing will look like. During a simulation, team members can observe how their individual efforts contribute to the project. Participation in the simulation itself generates enthusiasm. At the same time, by rehearsing the transmission, each person gets a chance to practice skills that will be required later, thus reducing their anxiety levels.

- Saving transmission time. Time, when you are transmitting, is very costly. By simulating transmission activities and rehearsing as if it were the "real thing", both the project team and users are better prepared for transmission. You do not waste valuable time during the transmissions teaching persons what to do.

- Debugging equipment and procedures. It does not require a satellite to rehearse a transmission. By creating realistic scenarios, you can put everyone through the system, utilizing all the equipment and procedures you intend to use during broadcasts. Video problems, actor movements, audio levels, equipment hook-ups, etc. can all be tested during a high fidelity simulation.

- Saving important person's time. A project may require highly paid "actors", tightly scheduled executives or overworked specialists during its transmissions. Since these people do not have time for long explanations and rehearsals, simulations can help you test out alternatives for integrating these important people into the transmission. Using a variety of procedures and stand-ins, you can simulate until you arrive at the optimal solution.

- Reducing the drama of the real thing. Many projects move from the planning stages through to transmission without ever successively approaching this final stage by means of a series of simulations that increase in fidelity as transmission time draws near. The result is that initial transmission comes as a quantum leap trailing confusion in its wake. Simulations gradually acclimatize the team personnel to the final stages of transmission, reduce the disorienting impact of suddenly facing strangers across great distances and permit persons to move into their roles with greater ease.

Simulations are useful for everyone involved in your project: planning team, project personnel, user groups, experts, technicians and even observers. Through the use of simulation, all aspects of your project can be tried out and refined long before your first transmitting day.

## Designing Your Own Simulations

As the advantage section suggests, simulations can be used at a number of different points throughout your project. In fact, simulation can be viewed as a series of successive approximations ultimately leading to actual satellite transmission. As the project progresses, the fidelity of the simulations increase. What follows are some suggestions for incorporating simulation into your project activities at the planning, testing and just-prior-to-transmission levels.

## Simulation for Planning

Just as the project is gearing up and getting started, it is useful to bring the team together to design a simulation of what it is you all expect the final outcomes to be.

### Procedure

1. Draw up as complete a list as possible of all persons who will be taking part in the transmissions.

2. List all equipment that is to be used.

3. Describe the facilities and sites that will be needed. Use pictures, drawings and maps if these are useful.

4. List all the activities that will occur during transmission.

5. List your time constraints.

6. Design a scenario for each type of transmission you intend to undertake. The scenario should include: a typical incident, the persons involved, and the space, time allocations and equipment required.

7. Assign roles from the scenario to different participants from the planning team and have them move through the scenario playing their various roles.

8. Assign observers to record what is going on. These observers should:

   - List materials that are referred to.
   - Record procedures.
   - Record questions.
   - Note problems that arise and how these are solved on the spur of the moment.
   - Describe spaces required.
   - Record significant comments that are made during the simulation.
   - Note need for more information.
   - List trouble spots.
   - Note points at which additional personnel or skills are required.

9. At the end of the simulation, bring the team together to study and analyze the information which the simulation has generated. Evaluate your plans in the light of this information. If a large number of unexpected events have occurred, rework your scenario and try it over again on the basis of the new information.

Benefits

As a result of this type of planning simulation you benefit in a number of different ways. You are able to:

- Verify the extent to which your initial plans are complete and operational.
- Edit materials and equipment lists to include missing items while eliminating unnecessary ones.
- More accurately assess transmission time requirements.
- Spot potential procedural trouble areas that need to be restructured.
- Identify information gaps that require filling.
- More realistically evaluate the impact of your proposed transmissions.
- Recycle your plans for later testing.

Simulation for Testing

Once the project is underway and equipment and materials have been partially designed or procurred, some initial testing of the system should be undertaken to assess the usability of the materials, identify potential problem areas, refine procedures and prepare personnel for transmission. At this stage, simulations are more realistic than at the planning level. Actual equipment, materials (even in prototype form), scripts and spaces may be involved. These types of simulations permit you to try out and refine the system you have designed from your plans.

Procedure

1. Select spaces similar to those which will be used during transmission. Using props or actual pieces of equipment which can be obtained without untoward difficulties, set up your spaces - both transmission and reception - to resemble as closely as possible the final configurations.
2. Procure whatever materials are available, regardless of their stages of development, for your simulation actors to use.
3. Draw up lists of the procedures you ultimately intend to use.
4. Design a realistic set of scenarios that include all the persons that would normally be involved in the situation as well as all necessary equipment, materials to be used and procedures to be followed. State set up and transmission time constraints.

5. Involve all persons from the project who are available. Provide stand-ins for those persons who are not available, but who would ultimately be involved in the exercise.

6. Run through the simulation scenarios under constraints that are as close to reality as possible. Since this type of simulation is designed to test out equipment, materials and procedures as well as prepare personnel to assume their ultimate roles, maintain an air of realism to the simulation. To do this:

   - Keep a fairly strict control of time.
   - Permit players only to speak or act as they normally would during a transmission.
   - Require persons to move as you expect them to during actual broadcasting.
   - Have players use equipment and materials as they are intended to be used.

   Set up some form of communications link between "transmitters" and "receivers". This can take the form of simple telephone or intercom hook-ups between rooms or even "Portapak" television transmissions to monitors.

7. Assign observers to each physical area of the simulation. These observers' tasks are to:

   - Record those parts of the procedures that run smoothly as well as those that are awkward or unworkable.
   - Note participant reactions and remarks that indicate confusions or concerns.
   - Time critical procedures.
   - Record on-the-spot modifications to the system or extemporaneous events that are worthy of retention.
   - Observe problems with equipment and/or materials.
   - Note space problems.
   - Note spots that require additional trouble-shooting.
   - Indicate need for additional personnel or upgrading of skills.
   - List additional information required.

8. After each scenario has been acted out, bring the observers and team members together to analyze the information recorded as well as to discuss what has occurred. As a result of this post-simulation discussion, you should be prepared to make changes to existing strategies and materials, alter personnel roles or make additions, and redesign your procedures to make them more workable. If a large number of problems occur, it may be worthwhile to redesign the entire system, redo the scenario and then recycle by going through another simulation exercise.

Benefits

This type of simulation helps you to:

- Test out the design of your system under conditions that are more realistic than the paper and pencil mode.
- Test available equipment, materials and procedures in a situation approximating the final one.
- Observe personnel skills in a simulated setting to note how well they work as a team and what gaps exist in co-ordination.
- Generate enthusiasm by letting persons "get a feel for the real thing" while decreasing anxieties by reducing risks of failure and damage to the system.
- Collect information on all aspects of the system that can help you refine and improve it.

Simulation for Transmission

Once everything has been completed and transmision time draws near, you can again use simulation to try out the entire system in a "dress-rehearsal" fashion. At this stage, everyone, with the exception of those specialists or guests who are unavailable, participates. You run a transmission using all material, equipment and procedures just as you ultimately intend to, with one omission - you do not use the satellite. Instead, transmission is conducted via land lines to other rooms or buildings. The purpose of this type of exercise is to test out all components that will be involved in the actual transmission. This permits persons to practice their roles, meet unexpected emergencies, fine-tune procedures and co-ordinate all the parts that will be affected during transmission.

Procedure

1. Prepare your studio or transmitting facility so that it is exactly as you intend it to be for your actual transmissions.
2. Install all available equipment as it will be during your transmissions.
3. Set up a simulated reception station or stations to resemble those that will actually be receiving your messages.
4. Set up a technical control center as close to the real one as possible.
5. Assign all personnel to roles they will be expected to play when the satellite is in use.
6. Assign stand-ins or unavailable persons - either specialists or users.
7. Prepare documents and materials in as close to final form as possible.

8. Design a realistic set of scenarios that are close to the real life situations you anticipate. For these scenarios, collect field data to make the simulation as realistic as possible.

9. Run through each scenario maintaining strict control over time. Insist that participants in the simulation act as though this were the real thing. Restrict comments and actions to those directly related to the scenario. Build in transmission breakdowns and other problems to test emergency or alternative procedures.

10. Assign as many observers as possible to the different parts of the simulation exercise. These observers should record:

    - The extent to which procedures are adhered to as well as their applicability under realistic conditions.
    - Problems that arise as well as solutions that are initiated.
    - The amount of time required for each activity.
    - Extemporaneous modifications to materials and procedures.
    - Equipment failures.
    - Space and movement problems.
    - Personnel that require additional preparation, performance aids or training.
    - Additional information required.
    - Dead spots where persons appear to lose interest.
    - Transmission or other technical difficulties.

    If it is feasible, the simulation should be recorded either on audio or video tape for later analysis.

11. After each dress-rehearsal simulation, bring observers and team members together to discuss what occurred during the rehearsal. Modify relevant parts of the procedure on the basis of data gathered during the simulation. Stress to participants the areas of their responsibilities that require improvement. Fine tune the entire system. Re-run the simulation with new scenarios if necessary to increase competence and improve the chances of transmission success.

Benefits

The benefits arising from this highly realistic just-prior-to-transmission simulation are many. You are able to:

- Provide final training for team members.

- Observe how the whole system will operate once the satellite link is included.
- Observe how equipment and personnel operate under stress conditions.
- Concentrate final preparation efforts on the weakest areas.
- Gather missing information and materials that have been overlooked.
- Make last-minute modifications on the basis of solid data rather than intuition.
- Build an esprit de corps among team members due to shared experiences.
- Select final procedures as a result of testing.
- Test emergency procedures.

Conclusion

What we have suggested above is that you can use simulation techniques to your advantage at the planning, testing and just-prior-to-transmission stages of your project. The stage or stages you select for including simulation activities as well as the extent to which you use them at any stage depends in large measure on the size, nature and time constraints of the project. As a general rule of thumb:

- the larger the project,
- the more complex the project,
- the more numerous the components,
- the more sophisticated and/or unfamiliar the equipment,
- the greater the need for training personnel,
- the less the experience of the team and/or project personnel, the greater the need for integrating simulation activities at all levels. Regardless of the nature and constraints of the project, however, there is always room for incorporating simulation in one form or another.

In dealing with simulation for planning, testing and preparation for transmission, it became clear that simulation could also be highly beneficial in the communication process itself. The aridity and self-consciousness of communication via satellite in many public service projects was often cited in our interviews and in the reports we examined on interactive educational projects. For this reason, Harold Stolovitch and Sivasailam Thiagarajan prepared a brief paper on Simulations and Games through Satellite Technology complete with two extended examples. Its purpose is to stimulate further thought on innovative ways for more richly exploiting satellite potential in the public service.

## Simulations and Games Through Satellite Technology

Satellites provide a powerful technology for bringing people together over great distances. This immediately suggests their application for long-distance learning and cultural exchange. To date however, most of the applications of satellite technology have been traditional and trite. The hardware technology is full of innovations, but the software technology - the technology of producing programs for transmission - is still at the primitive stage. Educational programming uses the traditional techniques of the conventional classroom. Exchanges between distant communities are often full of banal clichés or contrived creations.

The innovative technology of simulations and games offer an attractive alternative for satellite transmission programming. Loosely defined, a simulation is a controlled representation of some real-world event (as in a mock UN Security Council debate) and a game is an interactive activity which is initiated by setting up some conflict, governed by various rules, and terminated according to some special rules for determining who has won or lost. The techniques or simulations and games, either individually or in combination, have a lot to offer to satellite technology. They can help provide programs that involve the participants and make maximum use of the unique characteristics of transmission through long distances.

## Why Combine Simulation Gaming with Satellite Technology?

Time is at a premium in satellite transmission. In order to benefit from such transmissions, we have to work out techniques for efficient use of this valuable time. In a real-life colloquium, for example, time is lost through politeness and courtesy while people make sure that a speaker has finished and no other speakers are about to say something before volunteering a comment. In the real life situation these inactive periods do not matter much. But when such restraint is applied to expensive transmission time over satellites, it is very undesirable. The alternative is not to forget the courtesy of waiting for others to finish and allowing everybody to speak at the same time. The more efficient alternative is to impose some types of fair rules - as in a game - which assigns turns for different speakers and strict time limits for what they say.

Good group interaction requires that everyone is given equal chances to actively participate. For example, all students in a classroom have the equal opportunity to question the professor during the discussion period. Let's imagine that through satellite technology, two students from St. John's are listening to a question and answer session at the end of a presentation from Montreal. It is obvious that the local students have an advantage in attracting the speaker's attention and asking their questions. To provide equal opportunities for the long-distance learners, it is important that some types of rules are once again imposed on the activity.

In face-to-face interaction, we spend some time getting acquainted with other members of a group. With satellite technology, we may not be able to provide optimum time for the ice-breaking and socializing activities. With the use of simulations and games, we can get the participants interacting with greater intensity. It is obvious that the rules and the structure of a game provides some security for the players, permitting them to get involved at greater levels

of intensity than in the usual interaction. Similarly in simulated roleplay situations, players find it easier to be less inhibited because, "after all, they are playing a role". The latent acting talent inall human beings motivates them to more actively participate in the activity.

Satellite technology is most suited for bringing people at great distances together. Through its use, it is possible for members of a community in France to interact with members of a Francophone community in Manitoba. It is obvious that these different people have a number of differences and similarities in their perceptions, points of views, cultures and background. Thus the satellite provides an excellent vehicle for healthy cultural exchange. But it does not guarantee efficient cultural exchange. If for example, we use the transmission to have a Mayor from France lecture to the participants in Manitoba, this does not facilitate a true people-to-people, give-and-take exchange of culture. In searching for a structure which will permit a group of people at different levels and with different experiences to learn from each other, one is immediately reminded of games. This is the primary way through which different children learn from each other. And according to anthropologists, play is the major medium of cultural transmission among primitive societies. Perhaps we need to combine the sophistication of these primitive technologies with the high technology of satellite transmission in order to facilitate cultural exchanges in an efficient and equitable fashion.

While there are many similarities, it is obvious that people in different cultures do not agree on all issues. The attitude of a rural farmer toward meat prices in Canada will probably be markedly different from that of an urban resident. While a direct debate over satellite may help these two types of people exchange their opinions, that may not guarantee any true empathy for each other. In situations like this, simulations and roleplays have a tremendous impact. Having a group of rural and urban dwellers randomly take the roles of each other and then conduct a debate in a simulated setting (such as in Parliament) can provide opportunities for a true appreciation of each other's perceptions.

The rationale for the use of simulations and games in combination with satellite transmission may be summarized by saying that together, these provide more active, efficient, and meaningful opportunities for participation and mutual learning. In our discussion above, we focused on those aspects of simulations and games as they especially apply to satellite technology. In addition, simulations and games have their own intrinsic advantages as tools for learning and structuring group interactions. These unique advantages of the simulation/gaming format have been extensively recorded in the literature elsewhere. Therefore, rather than repeating them, let us spend our time more profitably in examining some sample applications of simulations and games to satellite technology.

Example 1 - Joint Venture

This is an imaginary cultural-exchange project which uses a simulation game. The setting involves two communities with five selected representatives assembled in a convenient studio a long distance away from each other. There is a game leader in a third and centralized location. This leader can communicate with both communities via audio and video. The two communities communicate with this game leader and with each other through audio-only links. This is the first transmission and members of both communities have earlier rehearsed the

transmission technology and are aware of the methods to be used as well as the limitations of the system. In addition to five selected representatives from the community who are actually participating in the game, there is a group of other members of each community watching and listening to the "game" through television monitors and public address systems.

The television set is turned on. After a lag, the game leader appears on the screen. He very briefly welcomes the participants in the two communities and checks the reception in all directions. He then presents the simulated scenario for what is to follow. The ten members from both communities have been appointed as members of a joint commission to explore different possible projects for them to undertake in order to bring these two cultures together. The leader announces that each member is now required to write down some suggestions for four or five suitable joint projects, individually, on a card. On the television screen the leader shows a few examples such as the following:

- Children from one community stay with a family in the other community for a week.

- Membersof both communities jointly design a mural which is to be placed (in duplicate) in the Town Halls of both communities.

- The ElementarySchool curriculum of both communities contains some instructional content related to the other community.

The individual representatives (ten in all) write down some notes for themselves. The audiences in either community act as kibitzers and make their own suggestions. After about two minutes, the game leader appears back on the television screen and asks the players to stop writing. He informs them that he is going to create a common list of suggestions by having each player contribute one idea at a time. At each turn, he randomly calls out the name of the player, alternating between the two communities, and writes down the suggested activity. Because this public list is clearly visible on the television screen, players can check and make sure that the suggestion they offer during their time is not a duplicate of what is already on the common list. This activity is continued until the public list has ten items.

The game leader now announces a consensus-forcing strategy. He requests each player to select secretly the single suggestion from the common list which he considers to be the best one. Players are informed that their scores depend upon the number of players choosing the same item. For example, if there are five players choosing the same suggestion, then each of the five players scores five points. If, among the other players, three choose suggestion D and the other two choose suggestion J, then the scores are 3 and 2 respectively for each of the players. After giving a minute's time for the selection, the game leader calls out different names for their choices. The TV screen now shows a roster of players' names along with their choices. After recording the individual choices, the leader computes the score for each player and records them in the same list. The screen now shifts back to the common list, and the leader draws a line through the suggestion which was selected by most players.

Players are required to select the second best solution, and so on until the top five suggestions have been identified. Each round is scored the same way. However, if in a given round, two items tie for most votes, the leader does not

take off either item from the common list. He calls for a debate, giving each player one minute to argue his position. After all players have had their say, the leader calls for a re-vote.

After the top five suggestions have been identified, the player with the highest score is declared to be the winner. This is followed by a debriefing session during which the leader points out how the players reduced a large number of individual suggestions to a carefully selected list of ten items, and how this common list was further reduced to a prioritized list of five items. The leader also points out how players from different communities voted on individual items, stressing the similarities across the communities and the differences within the same communities. Finally, the leader suggests that both communities seriously consider implementing one or more of the top suggestions in order to strengthen the ties between the two communities.

Example 2 - The Great Debate

This example deals with community participation on various national issues. It can also be played to deal with national participation on international issues. Once again, the setting involves representatives from each side. These representatives are assembled in two studios with facilities that permit two way video-audio hookup. As before there is a game leader who is operating from one studio. However, he is in a separate room and until the end of the game, neither community knows where he is located so that there is no feeling of partiality on the part of the leader.

At the beginning of the game, the leader announces that there is going to be a great debate on five issues of national importance. These issues are flashed on the TV screen:

- All provinces should be bilingual.
- Homeowners should be permitted to deduct municipal taxes and mortgage payments from their income for tax purposes.
- The provinces should have greater autonomy.
- Canada should be redivided into regions instead of provinces.
- The Senate should be transformed into a House of the Provinces.
- French should be compulsorily taught in all English-speaking provinces.

Before the debate s/he asks that each panel member and all members of the audience indicate their stand on these five issues on a simple ballot card supplied to them. These cards are collected by the local coordinators, who count the number of votes for each stand while the game proceeds.

Rather than allowing each representative to talk on issues of his own choice, the game leader assigns both the issue and the stand on the issue to different players. These assignments are shown on the television screen. They are so arranged that two people are randomly selected to take a positive stance and two others a negative stance on each issue. The leader specifies that each player is limited to this issue and to either the positive or the negative stance

assigned to him. The players are now given five minutes preparation time during which they collect suggestions from the audience in the local community on how to present their assigned point of view. Members of the audience seek out the player who has been assigned the position they personally believe in and offer facts, opinions and arguments to support that position. During this preparation time, cameras pick out groups huddled together frantically preparing positions.

At the end of preparation time, the leader initiates the debate. He selects an issue and alternately calls out the names of persons with positive and negative positions. The person whose name is called out, stands in front of the television camera and makes an impassioned plea for his position for two minutes. The leader also suggests that members of the audience listen carefully to these presentations since they will be required to decide on the relative merits of various presentations.

At the conclusion of all 20 presentations, the leader asks the members of the audience to indicate their present stand on the same simple ballot card they used before. The local community coordinators collect these cards and count the different votes while the game leader conducts a debriefing of the earlier activities, pointing out various similarities and differences in the arguments. After his speech, the local coordinators announce the earlier positions of the audience, and the later positions. They indicate any major changes and announce whether the positive or negative "sides" won each debate. For example, if the beginning votes indicated that 80 percent of the members of the audience (from both communities) thought that municipal taxes should be deductable from the income tax purposes and the later votes indicated 72 percent, then the negative side (viz. those who argued against this proposition) has won.

These two are justrandom examples of using simulation and game elements in programming for satellite transmission. We chose to illustrate the use of these techniques for community-based exchange of opinions and ideas and to stress ways of emphasizing how different communities may share similar opinions. Obviously there are other instructional and communicative uses for simulation games.

There are many games and simulations that are commercially available which can be used with satellite technology either in their current form or with some modifications. These games and simulations may be obtained from any of the standard directories which are available. Here are some additional sources of usable simulations and games for satellite transmission:

1. Books and articles in the field of urban planning and government. They are among the heaviest users of simulation game techniques.

2. Roleplays, psychodramas and sociodramas from the literature on social services. Many of these activities can be modified to permit satellite transmission. Sociodramas are especially powerful in getting strangers actively involved in interacting with each other under different roles assigned to them. This type of effectiveness should transfer to long-distance interactions via satellites.

3. Many of the classic games may lend themselves to satellite transmission. An excellent idea may be to have a program of exchange of local folk games from different communities. Rather than merely present the game, it should be possible to set up an actual play with members of each community participating in the session.

4. Many television games have a format which can be applied to beefing up an otherwise dull instructional presentation through satellites. An instructional lecture on medical technology, for example can be followed up by a quiz show to add motivation and appeal to the content while ensuring a thorough review of the major points presented.

5. Professional game designers are very creative in coming up with new game technologies to utilize advances in high technology. For example, game designers have created a host of new formats for the new video-and-microcomputer technology. Perhaps such game designers should be involved as consultants and team personnel in the creation of some new satellite technology project.

Summary for Objective 4

The project team considered this objective to be of special importance and permitted itself to expend considerable attention on it. The result of this effort has been three essays/models focusing on systematic development procedures, simulation in project development, and simulation gaming in the communications process itself. The purpose of the three papers is to provide practical performance aids to telecommunications satellite users in the education and health fields.

OBJECTIVE 5: Establish future demand estimates (traffic) and associated costs for providing this level of service.

The establishment of future demand estimates and associated costs is dependent on several key factors:

1. Services selected for satellite delivery.

2. Accurate cost figures.

3. Accurate assessment of benefits.

4. Government policies with respect to priorities, funding commitments, public access to satellites, and sincerity in developing and increasing public services.

5. Technological hardware developments.

6. Potential user awareness of telecommunications satellite capabilities.

7. Development of adequate user models to facilitate project proposal writing and render the use of telecommunications satellites a less formidable venture than at present.

8. Aggregation efforts to group together public service satellite users.

Many of these factors are at present so uncertain and the data available so unstable, that attempted estimates would be too gross and misleading to be of value. A project utilizing future forecasting instruments might prove beneficial at this stage, but in the face of so many unknowns, would still remain highly tentative.

The foregoing is the team's way of stating that it found no reasonable means for establishing traffic and cost estimates. It does, however, feel that we are approaching a point at which such an exercise will become meaningful.

> Telecommunications technology has experienced rapid development in the 1970's. The 1980's will test the viability of practical applications in the public service. (Bransford & Potter, 1978)

In this respect, we see the DOC pilot programme as a step in this direction:

> Under the auspices of the DOC, ANIK B will carry traffic on the 14/12 GHz channels, each with 72 MHz usable bandwidth. Industry, governments and educational institutions, as well as special interest groups, have already been canvassed for their proposals on a regional basis. Some of the pilot projects envisaged are:
>
> - educational TV;
> - community and health care services, and;
> - day-to-day information transfers for several provincial government ministries.
>
> In addition to these programs, other technical development projects have been scheduled. Once again, in co-operation with the DOC, examples of projects proposed by various organizations, including Telesat/TCTS are:
>
> - evaluation of digital transmissions and adaptive polarization;
> - geophysical studies and remote data collection, and;
> - propagation studies.
>
> Experience gained with this satellite will be beneficial to Telesat when implementing new services on the ANIK C series of satellites.

> In the opinion of the project team, however, the most important thrust toward the future lies with "aggregation": a bringing together of all kinds of non-profit public service agencies and dispensers in order to pool technical knowledge and "facilitate the application of telecommunications technology". (Bransford & Potter, 1978, p. 39).

Without some highly systematic form of co-ordination among public service satellite users, it is our opinion that future demands will be erratic, unstable and largely dominated by those who will have grown "wise" in the ways of satellite use. Already, this pattern is beginning to emerge in Canada. In terms of education, Bransford and Potter suggest that:

> "It is unlikely that telecommunications will be utilized extensively in the field of education in the absence of fundamental organizational changes."

Referring to health, they state:

> The principal problems facing the health service industry are access to patient care, skyrocketing costs and quality...

and conclude that:

> in education as in health, the fragmentation of programs and services accentuates problems in market development.

Aggregation appears to be the antidote to fragmentation, and in the Canadian context requires federal leadership and assistance. If the federal government is to be the major underwriter of public service, it will have to assist organizations to deal more closely together, sharing resources and reducing costs.

The project team has not taken up the cause of aggregation by whim. Virtually every major report it examined and in almost every discussion it held with past satellite users, aggregation of public service organizations was raised as an urgent matter. We have closely examined the Public Service Satellite Consortium (PSSC) in the U.S.A. from a Canadian point of view as well as the Conseil d'Orientation pour l'Utilisation des Satellites en Education (COPUSE) and the Forum of Canadian Users of Satellites (FOCUS) and feel that enough precedent and momentum exists to implement aggregation seriously. Only when this has occurred will any reasonable form of demand and cost estimates be able to be made with any degree of accuracy in the public service sector.

Since the team was not able to meet objective 5, it concludes this section of the report with a brief sketch as to what aggregation might look like. Pierre Brassard was mainly responsible for the scenario described below.

PANACAN: A Viable Public Service Satellite Users' Aggregation Model

Our reading of public service satellite reports and our interviews with past, present and prospective satellite users have left no doubt in our minds that the establishment of some sort of public service agency is needed to help render more rational public service satellite use. Such an agency would be able to:

1. Foster aggregation of resources and expertise among users.
2. Help integrate and systematize the preparation planning, carrying out, and evaluation of public service telecommunications satellite projects.
3. Act as an information clearinghouse.
4. Act as a policy co-ordinating agency to the federal and provincial governments.
5. Play a liaison role with TCTS.

To give birth to this agency, experts from health, education, research, administration, telecommunications, law, social service and other potential users along with various government representatives would have to get together to study:

1. How such an agency could be founded.

2. What its precise mandate would be.

3. How it would operate.

4. How it would be financed.

At present, there do exist groups of satellite users who have banded together to learn from one another and increase efficiency in the health and education fields (e.g. FOCUS, COPUSE). Other sectors such as environmental protection, natural resources, mines and law enforcement have also evinced interest in uniting in some way. These groups should be brought into the consulting process.

The federal government should play a key role in establishing this agency by making it Canada-wide and helping it devise means for reducing satellite exploitation costs. It should help it assume its place as a truly service oriented, non-profit agency operating with the collaboration of universities, educational and health authorities, radio and television networks, cable distributors and even telephone companies.

As an aside, it is interesting to note that all public service Hermès users have sent in requests to use ANIK B in 1979-80. In addition, 30 new user requests have also been received for ANIK B. No financing scheme presently exists to assist all these projects - a fact which influences the way in which these projects are managed and administered. To our knowledge, no significant grant has been allotted in Canada to study ways of improving management and administration of public service satellite projects, understandable perhaps if we consider that Canada has until now been in an experimental phase.

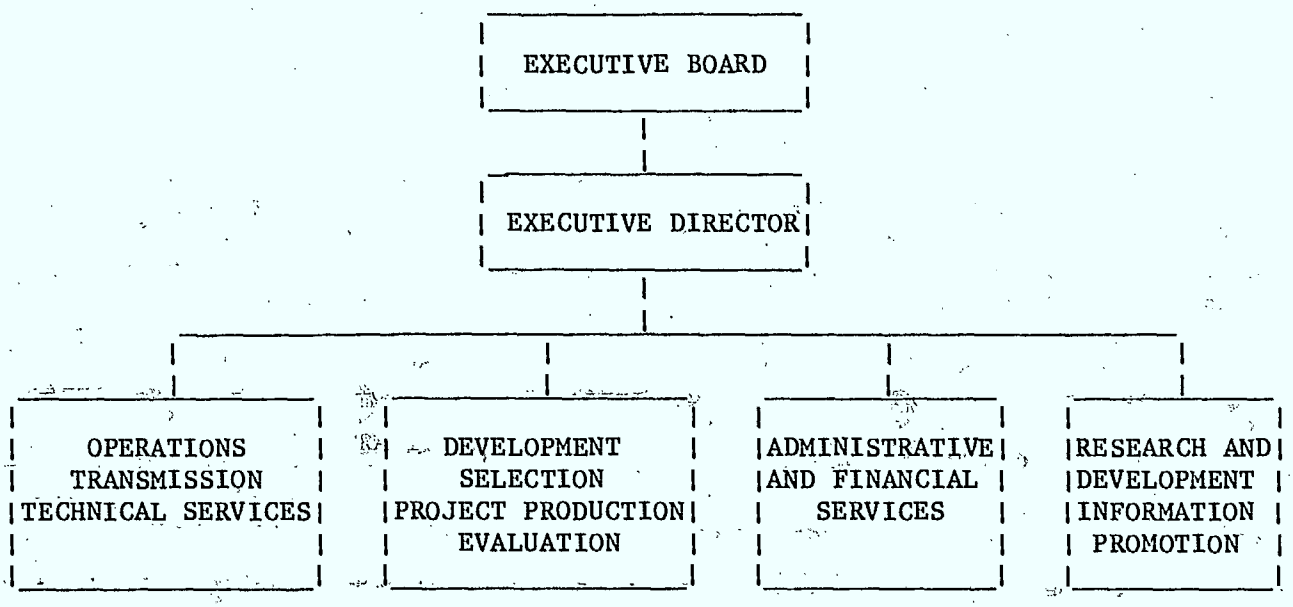
Returning to the concept of a public service satellite agency, we would like to sketch out a possible (we believe plausible) model that would be able to call upon the widest range of expertise available in all the different fields that public service satellite use requires. Let us name our agency, for convenience's sake, PANACAN - a truly Canada-wide public service satellite agency.

Characteristics of PANACAN

1. A crown agency created by the federal Ministry of Communications and administered by an executive board named by the cabinet for a period of five years.

2. The executive board, composed of professionals representing major public satellite service users (e.g. health and education) and telecommunications experts, is selected after consulting the Canadian Council of Ministers of Education, the ten provincial ministers of health and other appropriate provincial ministries.

3. The agency possesses four major competency areas which permit it to carry out its goals of exploiting to the fullest telecommunications satellite technology in delivering to Canadians needed public services.




4. PANACAN's public service mandate is to:

a) develop the human and technological resources needed to effectively exploit telecommunications satellite potential.

b) aid Canadian education, health and other sectors improve and diversify their public services through the use of satellite technology.

c) carry out research, develop and produce, in collaboration with appropriate institutions, educational, health and other public services which are indispensible for all Canadians.

d) make sure that satellite channels are available for delivering services to all parts of Canada and, when necessary, to other parts of the world, in collaboration with already existing agencies (e.g. Telesat, TCTS).

e) ensure that maximum public service benefits of satellite use are obtained at the most reasonable costs to users.

f) establish links with health, education, telecommunications and other appropriate agencies in countries which are also concerned with more effective use of satellites (e.g. Teleglobe).

g) act as a central public service satellite policy clearinghouse and co-ordinator for federal and provincial governments as well as an information dispenser to the public.

5. PANACAN is financed in the following manner:

   a) A foundation whose purpose is to foster the development of health, education and other public services is created.

   b) The federal government, via the Ministry of Communications, initiates a national public subscription campaign with a ten million dollar annual objective to finance PANACAN. The federal government provides a grant to match the collected contributions. LOTO CANADA funds are used as the federal government's portion. Provinces are encouraged to contribute via their ministries of health, education, etc.

Summary for Objective 5

The project team was unable to establish future demand estimates and associated costs for public service satellite use in education and health. This was due to an insufficiently reliable data base from which the team could make predictions with any degree of accuracy. The team asserted that only through a co-ordinated effort in the public service sector could meaningful estimates be derived. It stressed the importance of aggregation of public service organizations as the major means for stabilizing public service satellite use and offering some semblance of coherence among future projects. It concluded with a brief sketch of a possible aggregation model which it names PANACAN.

## CONCLUDING REMARKS

The main purpose of this project was to explore public service use of telecommunications satellites in Canada especially in the areas of education and health and come up with a set of suggestions that others can later explore in greater depth. The objectives were enormously ambitious given the time constraints (six months), the amount of funding, and the fact that all team members devoted only part of their professional energies to the project. Despite these limitations we believe that the project team did come up with some valid and valuable information, ideas and suggestions. These can be found scattered throughout this report under the five objectives.

We conclude our report with five fundamental recommendations:

1. DOC and other responsible agencies must continue to orient their thinking away from satellites and toward public service. The emphasis should be placed on carrying out thorough needs assessments to discover what constitutes priority public services. Once this has been performed, we can go on to systematically select the most cost beneficial means of delivering these services including telecommunications satellite delivery either exclusively or as an integral part of a combined system. Telecommunications satellites are not to be used for public service because they are there, but because they are relevant.

2. A task force should be created to explore the creation of a public service satellite agency such as PANACAN, the one we have invented. During the experimental phase, while the potential for public service delivery via satellite was being explored, a certain amount of informal and at times random behaviour was permissable. Redundancy, reinvention of the wheel and low benefit to cost ratios were affordable. Now the move is toward more coherent programmes and more rational ways of delivering needed services via satellite. Aggregation of users and services is essential. And a well-endowed agency that fits the special Canadian context is a sine qua non to further sensible public service exploitation of telecommunications satellites.

3. There is still far too much unsystematic behaviour associated with satellite projects at the user level. We have attempted to introduce several functional models for:

   a) systematically planning and carrying out a public service satellite project;

   b) integrating simulation into both the project preparation andcommunications processes;

   c) teasing out and even calculating cost-benefits.

   These models require experimental application and evaluation. Development of comprehensive and comprehensible procedural models for users should be made a priority.

4. Efforts must be made to systematically bring together in some coherent manner all the literature available on public service satellite use. Fugitive materials must be tracked down. Without this task being performed, there remains the strong dangers of:

   a) Project proposers attempting to recreate what has already been done.

   b) Screening committees approving projects that have already been performed.

   c) Painful unnecessary failures that could be avoided through forewarning.

   d) Stagnation because of a lack of documentation that charts both progress and success.

   e) A lack of co-ordination caused by ignorance of what is occurring elsewhere.

   f) Poor policy planning and decision-making due to insufficient information being available.

   g) Lack of break-through advances because of incomplete data.

5. All agencies involved in public service satellite use, both federal and provincial, must find a means of co-ordinating their policies and efforts with one another. In this field of communications, communications is currently very poor. A co-ordinating agency, preferably one that is linked with public service aggregation efforts, is necessary if there is to be progress.

Throughout this project, the team has attempted to remain objective in its handling of each objective. The recommendations we make are based on our interpretation of the data we uncovered. As we stated at the outset of this report, it is our firm belief that satellites have a great, yet largely unexploited, potential for improving public service delivery to Canadians <u>everywhere</u> in Canada. It is our hope that this report contributes to that improvement.

# APPENDIX A

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APPENDIX A

## BIBLIOGRAPHY

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# APPENDIX B

## PERSONS AND ORGANIZATIONS CONTACTED

APPENDIX B

## ORGANIZATIONS AND/OR REPRESENTATIVES MET DURING THE PROJECT

| Place | Organizations | Representative |
|---|---|---|
| Edmonton | Athabaska University<br>14515, 122th Avenue<br>Edmonton, Alberta | Dr. John Daniels<br>Mr. Murray Richmond<br>(403) 458-6903 |
| | Alberta Native Communication Society<br>9311, 60th Avenue<br>Edmonton, Alberta | Mr. Larry De Meule<br>(403) 437-0580 |
| | Alberta Educational Communication Authority (ARCA)<br>10053, 111 Street<br>Edmonton, Alberta | Mr. Kratz<br>(403) 427-4920 |
| Ontario | WA WA TA Native Communication Society<br>P.O. 1180<br>Sioux Lookout<br>Ontario, P0V 2T0 | Mr. Jim Morris & Staff<br>(807) 737-2951 |
| | Ontario Education Communication Authority (ORCA)<br>P.O. 200 - Branch "Q"<br>Toronto, Ontario M4T 2T1 | Mr. P. Bowers<br>Mr. L. Lacroix<br>(416) 484-2600 |
| | Ontario Government<br>c/o Telecommunication Branch<br>22 College Street<br>Toronto, Ontario | Mr. D. Towers<br>Mr. Chung Yan<br>(416) 965-0175 |
| | Western University<br>c/o TeleMedicine<br>London, Ontario | Dr. L. Carey<br>(519) 673-3235 |
| | Health and Welfare Canada<br>1048 Brooke Claxton Building<br>Tunneys Pastures<br>Ottawa, Ontario | Mr. B. Long & Staff<br>& Dr. H. J. Bagnall<br>(613) 992-4197<br>(613) 729-1120 |
| | Telesat Canada<br>333 River Road<br>Ottawa, Ontario | M. A. Ouimet<br>Mr. Lester<br>(613) 746-5920 |
| Québec | Université du Québec<br>Siège Social<br>Boulevard Laurier<br>Ste-Foy, Québec | M. Robert Dupuis<br>(418) 657-2310 |

APPENDIX B

ORGANIZATIONS AND/OR REPRESENTATIVES MET DURING THE PROJECT (Cont'd)

| Place | Organizations | Representative |
|---|---|---|
| Québec | Services généraux des moyens d'enseignement<br>600, rue Fullum<br>Montréal, Québec | Mlle. M. Tremblay<br>M. R. Marquette |
| | Université de Montréal<br>Faculté d'education permanente<br>B.P. 6203<br>Montréal, Québec | Mme. M. E. Taggart |

N.B. For those organizations and/or representative users of satellite that we could not meet we did review in detail the various reports of their past experiences, e.g. Memorial University of Newfoundland.

# APPENDIX C

## LETTER FOR INTRODUCING THE PROJECT TO INTERVIEWEES

APPENDIX C

LETTER FOR INTRODUCING THE PROJECT TO INTERVIEWEES

Montreal, 1979-03-26

Reference: Satellite and Public Services

Dear

Hopefully you will excuse the impersonality of this letter which acts as a follow-up to our telephone conversation, but in view of the fact that time is running short, I am sure you will forgive me. I thank you in advance.

Allow me to repeat our meeting time: _____ _____ 1979, I will let you know if any delay occurs due to storm or ... (hopefully not!).

The project that we are working on aims to study the economic, policy and institutional issues influencing the use of satellite based telecommunications facilities for public services.

Satellites cannot be measured in the same simple financial terms as commercial applications. Thus even though effective demonstrations have been made "the Canadian satellites are underexploited and the improvement of their performances increases the gap between their real possibilities and the use that we are making of them."(1)

It is by no means clear what public services can be beneficially carried by satellites and what problems impede their implementation.

The project, in studying these issues, endeavours to shed light on them in a manner which will facilitate the decision-making processes of the Department of Communications and the immediate and future uses of satellites.

Obviously we are concerned with all forms of public services. However, considering the limited funding, time and manpower available, our in-depth study will concentrate on two of the more important public related services:

- health care delivery
- education and training services for both grade school and secondary levels.

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(1) Dr. W. Melody, SFU; Hermès Symposium, Ottawa - December 1977.

.../2

APPENDIX C

LETTER FOR INTRODUCING THE PROJECT TO INTERVIEWEES (Cont'd)



Nevertheless we welcome all suggestions and ideas that you may have or be concerned with that are outside of our specific area of concentration.

In order to save time and mutually help one another, here are some suggested objectives for our meeting:

Priorities Considering your needs and future projects, we will try together to briefly:

B 1. "Identify" the types and "establish" the characteristics of public services which could be provided with the aid of telecommunications satellites.

B 2. Identify, analyze and give suggestions on existing policies and institutional structures which affect the introduction of such services.

A 3. Obtain your views on the economics of satellite delivery public services and attempt to identify those services which appear to have the highest value commensurate with their costs.

C 4. Give plausible plans of action and working models (projections) which could be the basis for DOC initiatives to improve the level of satellite-based public services available to Canadians, concentrating on the two priority services described above.

A 5. Record your recommendations for future demand estimates (traffic) and associated costs for providing this level of services.

I am aware of the short notice I give you, but the above, I think, will ease our exchanges and discussion on this important subject. If you have the time to put a few of your thoughts in writing it would also help tremendously.

I thank you in advance and I look forward to meeting you.

Sincerely,

Principal researcher: Pierre Pérusse, Ph.D.
Directeur
Département Technologie Educationnelle
Université de Montréal
Tél. (514) 343-7600

DOC advisor: Dr. C. Billowes

A STUDY OF THE ECONOMIC, POLICY AND INSTITUTIONAL ISSUES INFLUENCING THE USE OF SATELLITE BASED TELECOMMUNICATION FACILITIES FOR PUBLIC SERVICES: FINAL REPORT.