A REPORT ON THE PROCESS OF IMPLEMENTATION OF HERMES EXPERIMENTS

by

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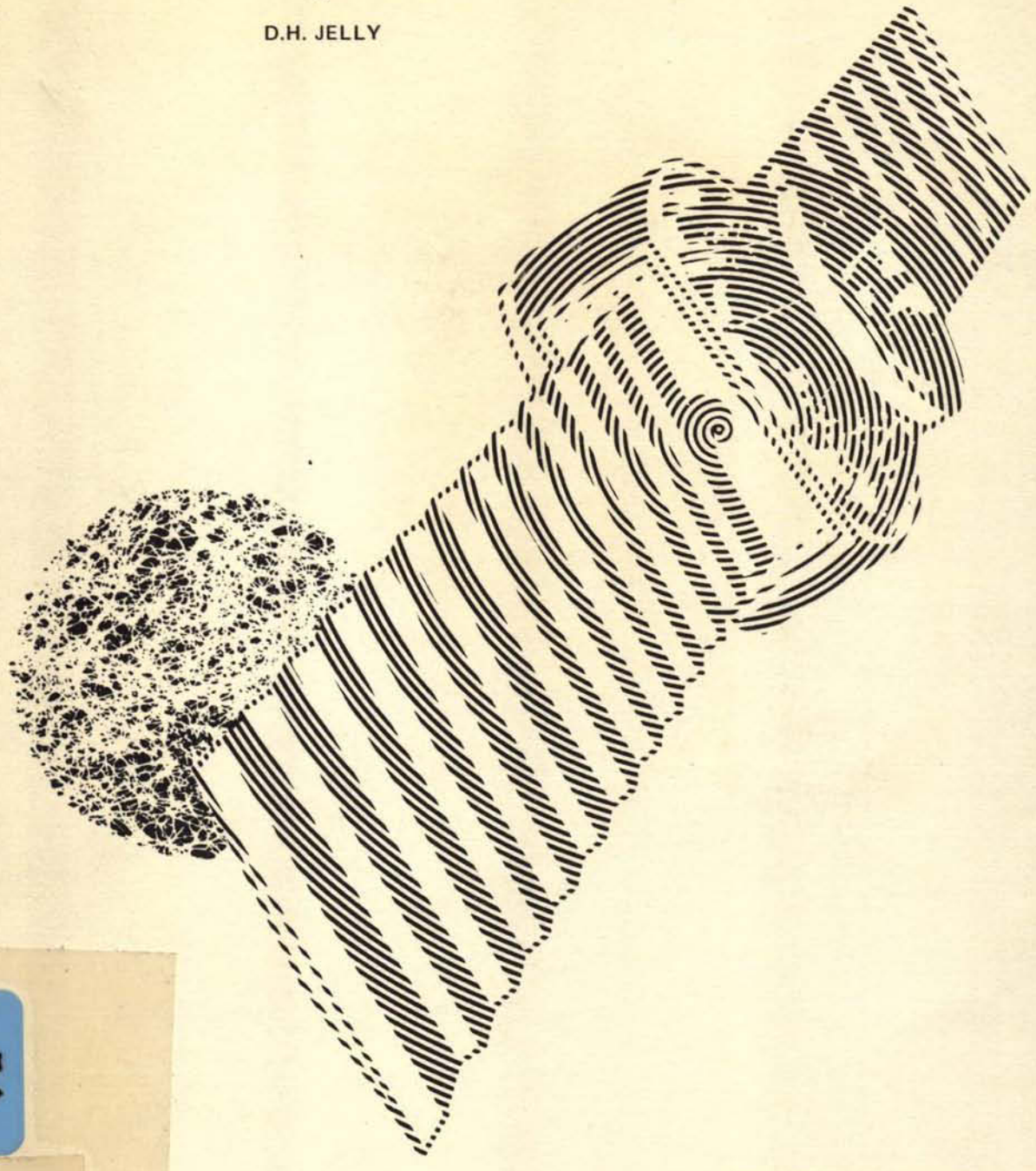

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Evaluation

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Communications Research Centre

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COMMUNICATIONS RESEARCH CENTRE

DEPARTMENT OF COMMUNICATIONS
CANADA

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SUMMARY

In the course of planning and implementing the social experiments using the Hermes Communications Satellite, much has been learned by both DOC and the experimenters about the process of carrying out such projects. This report records some of the experiences, observations and recommendations and is based largely on "debriefing" sessions held with experimenters in September, 1977.

The following main points are distilled from the report:

General Comments

a) The projects, (while continuing to be referred to as experiments), should be regarded basically as demonstrations in that they were generally too short to qualify as valid experiments that would produce statistically significant results. They were successful in demonstrating technical and operational feasibility if not in proving utility or cost-effectiveness.

b) The efforts required by DOC and experimenters were much greater than originally envisioned.

c) There were many benefits to the experimenters beyond the direct outcome of the experiments. These included strengthened management structures, better knowledge of communications in general, benefit of direct hands-on experience, the public relations benefits associated with high-profile activities and, perhaps most importantly, contacts with other groups across the country with similar interests and amongst whom information continues to flow.

d) Several experimenters are carrying on projects which have grown out of the Hermes experiments (see Appendix A) and several have shown an interest in sponsoring pilot projects using the ANIK-B satellite.

Management

a) Several management styles were used and found to be effective in carrying out the projects.

b) The following recommendations were made for carrying out similar projects:

   i) commitment of senior management must be secured;

   ii) responsibilities must be clearly defined;

iii) continuity of personnel is important and special attention should be given to this aspect of staffing;

iv) projects should not be undertaken with only part-time staff;

v) milestones should be set and adhered to;

vi) careful consideration should be given to information exchange and co-ordination.

Funding

a) Special strategies were necessary to keep experiments alive in a tight money environment. Successes were due in many cases to the dedication of individuals and also to organizations that absorbed many hidden costs.

b) Recommendation:

i) DOC should develop a funding policy and stick to it.

Technical

a) The communications system (satellite plus earth terminals) that was designed largely before the experiments were defined was found to be generally adequate.

b) The video was found to be of very good quality and easy to use; the audio almost invariably presented problems associated with the interface between the experimenters' equipment and the earth terminals.

c) Recommendations:

i) More simulations and off-line testing should be carried out.

ii) More technical support should be available.

Interaction

The answer to any question about the factors and configurations likely to promote high-quality satellite exchanges must always be qualified in terms of the particular situation proposed.

Evaluation

Both the questions asked - and those left unasked - by DOC, the experimenters and the evaluators at an early stage in the project have a lasting influence. In future projects it will be important to establish from the outset, and communicate widely, a consensus on the overall experimental objectives and the key questions to which evaluators should address themselves.

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ABSTRACT

In carrying out the communications experiments using the Hermes satellite, considerable practical knowledge was acquired by DOC and by the experimenters about the process of experiment implementation. This Technical Note records many experiences, observations and recommendations regarding the process. It is based largely on a debriefing session of the major social experimenters sponsored by DOC in September, 1977. It is intended as a reference for those involved in planning future communications projects. Topics emphasized in the report are administration, technical aspects, interaction and evaluation.

1. INTRODUCTION

The Hermes satellite program (originally called the Communications Technology Satellite) is a co-operative program of the United States and Canadian governments. The satellite operates in the 12/14 GHz frequency band which permits the use of a high satellite transmit power and reduced size and increased portability for the ground stations. Programs were developed by each country to use the communications capability of the satellite to carry out social and technical experiments. The Canadian portion of the program was developed by the Department of Communications and involved experiments sponsored by government departments (federal and provincial), universities, industry and native organizations. A family of earth terminals capable of permitting a variety of audio and video configurations was designed by DOC and made available to the experimenters to carry out their projects. The experimenters were committed to performing evaluations of the experiments and providing reports to DOC.

When most of the major Hermes experiments approved to be carried out during the originally planned two-year mission had been completed, it was realized by DOC staff that information additional to that in evaluation reports being prepared by the experimenters could, and should, be obtained concerning the *process* of experiment implementation. The experimenters, and DOC, have learned a great deal about the practicalities of actual experiment implementation, and it was considered that these lessons should be reviewed in detail for possible application during implementation of third-year Hermes experiments and the next generation of activities, the ANIK-B pilot projects After weighing various alternatives for collecting the available information, it was considered that the most effective method would be to assemble a group of manageable size for a fairly structured debriefing session.

Consequently, DOC organized a workshop to exchange information with a selected group of Hermes experimenters. Those invited included representatives of the major social experiments that had been completed at that time. To provide as broad a discussion as possible at the meeting, several experiment evaluators were invited, as well as DOC staff. Lists of experimenters represented and attendees are included as Table 1 and Appendix B. Brief descriptions of these experiments have been added as Appendix C. (For completeness, descriptions have been included of the two major social experiments that were completed subsequent to the workshop - Saskatchewan-Quebec and B.C.).

TABLE 1

Experiments Represented
(for more detail, see Appendices B & C)

F-3	Public Service Commission – Tele-education
P-1	Memorial University – Telemedicine
P-2-3	University of Quebec – Tele-education
P-3	Government of Ontario – Administrative Services
U-1	Carleton University – Tele-education
U-6	University of Western Ontario – Telemedicine
E-2	Alberta Native Communications Society – Community Interaction

The workshop was organized into four consecutive half-day sessions devoted to topics as shown in Table 2. The sessions were chaired by DOC project personnel, each of whom distributed questions to aid in focussing the discussion. A lead-off speaker had been designated to initiate discussion by addressing the questions from the point of view of a specific experiment. A rapporteur had also been designated to provide a verbal summary at the end of the session and a written report for the summary record. The list of questions posed by each of the chairmen is included in this report as well as the rapporteurs' reports which are reproduced with some editorial changes necessary to put the comments into context for non-participant readers.

TABLE 2

Organization of Sessions

Session	Chairman	Lead Speaker	Rapporteur
1. Administration	T. Kerr	G. Chung-Yan	J. Roberts
2. Technical	J. Day	K. Hauschildt	E. Johnston
3. Interaction	A. Casey-Stahmer	R. Dupuy	J. Daniel
4. Evaluation	A. Casey-Stahmer	R. Roberts	J. Daniel

To make a more complete documentation of the process of experiment implementation, this report covers a considerably broader scope than just a record of the meeting. Where time did not permit a full and thorough exchange during the meeting, priority was placed on obtaining the input from the experimenters rather than in clarifying DOC's position in each exchange. Comments have therefore been added to amplify the DOC point of view to provide a balanced report. In addition, some comments have been added to include aspects of the discussion of particular significance to DOC, but perhaps not to experimenters.

The response to the meeting was very gratifying to DOC both in terms of the attendance, with each of the major social experiments being represented, and the willingness of the participants to share with DOC and the other experimenters their opinions and their experiences, both positive and negative. The reports submitted by the rapporteurs provided a good representation of the interaction that was forthcoming.

It should be noted that all the experiments that were represented were successful. It is not surprising, therefore, that the meeting itself, the rapporteurs' summaries, and the DOC comments refer at times to negative aspects of the process, because the overall emphasis of the discussions was on the value of the experiments as a learning experience for all who were involved, be they experimenters or DOC staff. The sessions were in general oriented towards the exchange of views on the processes and the suggestion of improvements that could have been incorporated. The feedback thus obtained is very helpful to DOC and hopefully to others in planning further communications projects.

A list has been added (see Appendix A) of various activities that have been continued by the sponsors of several Hermes experiments in the field of telecommunications.

2. SESSION 1 - ADMINISTRATION

Chairman: T. Kerr
Lead Speaker: G. Chung-Yan
Rapporteur: J. Roberts

2.1 QUESTIONS

1) Information transfer/exchange - was the DOC role appropriate and adequately fulfilled?

2) Schedule - was this adequate for experiment needs?

3) Experimenter organization - were human resources adequate in number, and was organization of these resources appropriate to meet the needs of the experiment?

4) Experiment management - was DOC involvement to a greater or lesser degree than necessary, and in the right areas of activity?

5) Funding - was funding adequate, timely, and administered properly?

6) Logistics - were the experimenter/DOC administration interfaces adequate for terminal installations, operation and maintenance?

2.2 RAPPORTEUR'S REPORT

1) Terry Kerr outlined the issues covered by the questions as a framework for discussion during the session. He mentioned that discussion relating to schedules would be particularly interesting from DOC's viewpoint as it was the major issue involved in most DOC-experimenter negotiations, and of all the matters listed, took the most DOC time and effort.

2) Glen Chung-Yan spoke as follows:

   a) A historical account of the development of the Ontario Government project was given. DOC's *information role* was considered to be quite adequate.

   b) The *schedule* (every other day for a few weeks) did not permit one to mount an operational project, but did facilitate a *demonstration* of what could be done from a technical point of view. Pilot projects could follow up these initial efforts.

   c) Organization: The Telecommunications Services Branch (TSB) ended up as co-ordinator of several experiments conducted by various Ministries of the Government of Ontario. Its main role was to provide technical information to interested Ministries who had a responsibility to develop programs. The division of responsibility worked well. The major problem was that various Ministries' personnel were doing Hermes work in addition to their normal work,

which sometimes took precedence. The need for project commitment and recognition of the commitment from the highest supervisory level was stressed.

d) *Funding:* TSB paid all common costs, primarily technical, and each Ministry sought its own program funding. Only one Ministry developed a shortfall in Phase II and had to withdraw.

e) *Logistics:* The only problem related to matters such as terminal transportation and installation was that the foundation for the 1-metre terminal was over-engineered because Ontario Government personnel felt additional safety factors were needed.

3) Doug Towers added that:

a) a project management *schedule* would need some definite and unchanging milestones, for the mutual benefit of both DOC and experimenters;

b) *funding* needed to be guaranteed early and DOC should, in future, not modify whatever funding policy it officially adopts;

c) with respect to *experimenter organization*, (i) planning should be done as far ahead as possible; (ii) there should be a clear division of responsibility; (iii) the manager/co-ordinator should have a practical background, not just an academic one; and (iv) continuity of personnel both within the experiment and at DOC is very important. Informal, well established, working relationships become particularly important during the operational phase.

NOTE: The continuity and division of responsibility was considered important in the evaluation session with respect to the relationship between the experiment implementation personnel and the evaluation personnel.

4) Dr. House emphasized the importance of *personnel*: continuity, commitment (and at senior levels), division of responsibility (but close contact among various project groups), and regular meetings, properly minuted, were all key issues in his view.

5) Robert Dupuy commented on the Université du Québec (UQ) experience:

experiment management: UQ in Quebec City co-ordinated the participation of several of their distributed campuses in Hermes experiments (compare TSB role vis-a-vis Ontario Ministries). Parallel co-ordination *between* institutions as well as *within* institutions was a central feature. Unlike TSB, UQ's Quebec City office did not direct local campuses and each had to go through its own learning process. Problems arose with the interface between the academic and administrative branches of the Université. Also there were conflicts similar to the Ontario experience with the conflicting priorities between regular work and the needs of the satellite experiment.

6) The discussion then became more general, with shorter and varied interventions by several people. The main points raised were as follows:

a) Balancing the various elements of a project was seen as the major *administrative* challenge: i.e., central vs local control, technical vs content aspects, meetings and information flow adequate vs overdone, priorities of funding agency vs those of the experimenter, service vs research vs government policy emphasis; structure vs flexible areas.

NOTE: Both in this session and the technical session, it was agreed that DOC could have greatly assisted experimenters by circulating information about any technical problem to all future users; the last user should not be completely surprised by problems experienced by every previous user.

The issue of conflicting priorities also arose in the discussion of the relationship between the evaluators and DOC. (See minutes of evaluation session 5.2).

b) *Personnel*, roles and responsibility, commitment and continuity, were mentioned several times. The amount of time and effort required in the experiments was substantial and it was agreed that no one could make a similar commitment "the next time around". Projects differed in terms of the amount of work carried out by regular staff in addition to their normal duties and the work done by others specifically hired for the experiment. It was agreed that people wanted to use the satellite as much as possible, and for a *short* time were willing to overextend themselves. Planners of future projects will have to consider very carefully the work load involved, and whether it will be reduced due to the experience with Hermes.

c) Funding was a major problem for several of the experimenters and delays in having it guaranteed placed constraints on the proper preparation of at least some of the projects. Substantial "out of pocket" contributions were made by experimenters and sub-experimenters and these do not show up on the financial statements of the projects.

d) The importance of contingency planning, Murphy's Law and "back-up" personnel was also stressed. The need for contingency funding was also discussed.

e) The alternative of in-house vs external engineering was briefly discussed with the observations being made that consultants may tend to work to their own objectives.

f) The public relations functions (particularly toward the end of an experiment) were seen to be a problem that could best be dealt with by meeting with and accommodating the media.

7) Although there was a lot learned by the experimenters, there was a general consensus that many of the Hermes first two years lessons were negative in the sense that we all learned what not to do. Nevertheless, these are exactly the lessons that will be useful in the planning of future telecommunications services. An initial perspective of "what can we do with the satellite?" changed into "what does the satellite do to you?", i.e. in an organizational sense, a satellite experiment tends to dominate other activities.

People also agreed that most of the above concerns about administration varied to some extent as a function of the scope and type of the project; e.g. education programs required more preparation and simulation than a medical consultation.

8) There were a lot of spin-offs due to the Hermes experiments of which the following are examples:

a) decentralized management techniques were developed for other work,

b) weak spots were revealed in current operations and improvements were developed,

c) new roles for regular personnel were developed and the potential of existing staff was reassessed.

9) As the only experimenter present who was still using Hermes, Larry Desmeules reported on the Alberta Native Communications Society (ANCS) experience.

a) ANCS experienced most of the organizational and funding problems described by others in its Phase I; the current Phase II was running much more smoothly as a result of the lessons learned. Assured *funding* was still a problem though.

b) ANCS already had an organization responsible for communications programs before it started Hermes; its production, evaluation, etc. units had been in place for years. Also, the objectives of the Hermes broadcasts were similar to ANCS's regular activities: i.e. to entertain, to make native people aware of government programs. (This service emphasis was similar to the UWO Telemedicine). One difference was that the Hermes project had an advisory committee of representatives of various government departments who participated in programming as well. It was hoped to sensitize them to native concerns and to involve them through Hermes in future ANCS work. It was easy to entice them to participate because the program involved no cost to them.

c) Hermes has given ANCS a higher profile and made it more embarrassing for government to ignore them. The lack of symmetry in the system (video transmissions from Edmonton with audio interaction) gave native people a feeling of power over officials. Being unseen and thus unidentifiable, native people felt more confident about expressing their concerns to government officials.

2.3 AUTHOR'S COMMENTS

1) *Information Transfer/Exchange*

During this session, it seemed that DOC's role was perceived to have been appropriate and adequately filled; however, during the following technical session, several problems of information flow did surface and are dealt with in Sections 3.2 and 3.3.

Several mechanisms were used to facilitate information exchange. Three major meetings were held, and while they did provide a forum for experimenters to interact, they did not satisfy DOC's need for interaction with individual experimenters. Information Bulletins were circulated but they were found to be too time-consuming to generate and hence too slow to circulate for the benefit realized. The most effective method of information exchange was through a series of meetings with each experimenter. A DOC team made up of a representative of systems, operations, scheduling, evaluation and co-ordination, as appropriate, met with each group. An effort was made to maintain the continuity of the team for a given experiment. From the discussion reported above, continuity of personnel was perceived by the experimenters as being important.

At meetings and other interactions with experimenters, a focus for exchange of information for development of experiments was a document format called the Experiment Plan. This covered all aspects of experiment planning, including management, funding, scheduling, technical operation and evaluation. While in practice the Plan was developed to varying degrees of completeness, the concept was found to be very effective in providing information for joint planning by DOC and the experimenter. The Plan was in fact used as an agenda in meetings with the experimenters. A continuing problem for DOC was getting adequate detail in a timely manner for DOC planning.

2) *Schedule*

Negative comments were heard, some of which were related to constraints inherent in the program, e.g:

a) Time was too short for valid experiments and hence the projects carried out were more in the nature of demonstrations.

b) The every-other-day schedule was not appropriate for operational simulation.

c) Experiments were adversely affected by shifts of dates due to project exigencies, e.g. delays necessitated by the satellite launch slip of four months and by no operations during the first two eclipses. The experiments that were affected negatively were those that were seasonal in nature such as educational activities. Several other experiments were aided by delays in that more time was available to obtain funding.

Other negative comments were directly related to the specific times allocated to the experimenter. Since these had been negotiated with the experimenters in advance, the dissatisfaction with the outcome must be viewed as a valid output of the experiment, e.g.

d) The time available was too concentrated; for example, doctors can devote only a limited number of hours per week to continuing education.

e) Times were not appropriate; for example, continuing education at 9 a.m. conflicted with doctors' other commitments.

f) Requirements for overtime necessitated by the schedule had not been considered.

A problem which DOC identified early on was the extent to which experimenters under-estimated the time required for installing and checking out their system with the satellite before it could be handed over for programming. As a result, on several occasions users and technical personnel were vying for scheduled time and opening ceremonies often took place via a configuration that had not previously been used (a questionable practice!)

For some experimenters, the schedule imposed a relentless burden, from which they escaped only when the terminals were removed. The comment repeated by several groups, "We were glad to see you go", was an indication of the strain involved.

3) *Experimenter Organization*

Of interest to DOC was the variety of organizational structures used to manage the experiments. Some were carried out within existing frameworks whereas others were dependent for their success on entirely new structures being developed. These experienced project teams are now seen as an important spin-off of the Hermes program. In fact, one of the things they have learned is that, in general, they could not carry on the project in an operational sense without a larger staff and particularly without more full-time personnel.

During the planning stages of several social experiments, there was found to be a tendency to overlook the need for commitment of resources in the technical and/or evaluation areas. The importance of having both these areas adequately covered is now emphasized by DOC in discussions with potential experimenters. On the technical side, there must be qualified people available during the systems design phase and throughout the operations phase. For comments on evaluation, see Section 5.

4) *DOC Involvement*

The original DOC position was one of non-intervention beyond approving experiments, providing terminals and advising on their use. Early on, it was realized that this was too simplistic and that much more assistance and support would be required to enable the experiments

to be carried out in a productive manner. The assistance finally provided covered a whole range of activities such as management consulting, setting specific objectives, designing the system, logistics assistance, developing appropriate evaluation designs, and in special cases, providing the funding and managing contracts to implement the experiment.

These additional requirements beyond the original commitments placed severe strains on DOC resources in terms of both manpower and finances. Because of the original policy of non-involvement plus the limits of resources, DOC had to make hard decisions regarding the degree of support appropriate for a given experiment. To what extent should DOC intervene in the interests of "making the experiment work?" It was satisfying to hear that some groups felt that they had benefitted through the process of learning by doing (including making mistakes), suggesting that DOC would have erred in providing more assistance. In other instances where DOC had provided major funding, the experimenters realized that they had lost substantial control of the experiment.

Other difficulties were encountered by DOC when the experimenter decided to make changes that had a significant impact on the use of DOC resources.

An organizational problem surfaced in connection with the operation of the 3-metre terminals. Since these terminals were situated in locations near to the experimenters' facilities, a close liaison tended to form between the 3-metre terminal operators and the experimenters' personnel. While good working relations are always to be encouraged, there was a tendency for perceptions of responsibilities and authority to become blurred. The experimenters tended to look to the operator as the local DOC representative in areas beyond his knowledge and authority, and the operators sometimes responded to the experimenters' priorities rather than DOC's. For longer term operations, the role of the operators would have to be clearly established to maintain adequate control of the system.

5) *Funding*

Many funding problems were encountered. Some experiments were withdrawn due to lack of financial support. Perhaps in some cases, the fact that support was not forthcoming could be interpreted as a lack of viability of the concept. In most cases, the funds available were substantially less than what was originally estimated and sought. In most cases, the reduced funds did not seriously reduce the effectiveness of the experiment and in some cases, by being reduced in scope, the experiments became more realistic. Funds were often very late in being assured; nevertheless, it was possible to carry on the experiment because of the continued commitment of the sponsoring groups and effective forward planning. In those cases where DOC funding was provided to an experimenter, it was on the basis of a contract in support of specific activities of direct interest to DOC and for which no other funding source could be identified. The contractual nature of the support often had to be clarified with the experimenter who tended to consider the funding as a grant.

6) *Logistics*

In general the reaction was favourable to the DOC support in this area of activity. Complaints focussed mainly on the bulkiness of the small terminals. The problems encountered and overcome by DOC were innumerable. One frequently recurring situation was the lack of preparation of bases for terminal installation. Not having a telephone close by often hindered terminal check-out. Further comments related to logistics were made during the Technical Session.

2.4 ADDITIONAL COMMENTS

L. Leclerc of the Ministrè des Communications du Québec wished to add the following observations that he made in his role as co-ordinator of the Quebec experiments:

"From the point of view of co-ordination the Hermes experience has brought out two principal points.

We wondered, on the one hand, if our role was always clearly seen by the users. We believe that a better information flow could have existed between us and the latter, by such means as more frequent information meetings and an occasional circular letter.

On the other hand, to save time, we had to deal with problems on a basis of verbal communications, based on the good will of the participants. This method is fast and efficient, but as a result, we have little written documentation of a given meeting or decision which was made. This led in certain cases to embarrassing situations and makes an evaluation of our activity difficult. In conclusion, it will be necessary to better structure our interventions in the future."

3. SESSION 2 - TECHNICAL

Chairman: J. Day
Lead Speaker: K. Hauschildt
Rapporteur: E. Johnston

3.1 QUESTIONS

On the following areas:

a) ground terminals - size, installation, operation, facilities provided, maintenance, etc.

b) video system - signal quality, etc.

c) telephony system - signal quality, dialing procedures, conferencing capabilities, number of channels, etc.

d) interface between ground terminals and experimenter supplied equipment,

e) experimenter supplied equipment to be interfaced with ground terminals,

What factors, in the conduct of the experiment:

a) gave the most problems and why,

b) gave the least problems,

c) might have been handled differently, and if so how and why?

3.2 RAPPORTEUR'S REPORT

The Chairman, in his introduction, reviewed some of the difficulties of having to design a system without input from the potential user. He also indicated the importance of the meeting in providing recommendations for the design of future terminals.

Ken Hauschildt (Memorial U) opened the discussion with a review of the engineering work associated with the medical educational TV experiment and pointed out that the audio teleconference system was the biggest source of trouble (a view which was shared by most of the experimenters). The major audio problems were:

1) Poor S/N ratio on the telephone channel. This created problems when background noise caused the voice-activated switch in the "DAROME" unit to operate.

2) The use of broadcast-industry audio standards rather than the telephony interface on the Telephone Interface Unit would have helped simplify the design of the audio conference facility.

3) Some of the initial interface problems might have been avoided had the interface been simulated in the laboratory before the system was installed on site.

There then followed a general discussion of the "Echo-Feedback" problem and how it was resolved by different experimenters. The use of special room acoustics, press-to-talk microphones and voice-activated switching was reviewed. The conclusions were that further technical studies were required, and the system design would be dictated by the particular needs and constraints of the user (see Section 4 on "Interaction").

Radio Frequency Interference (RFI) at intermediate frequencies and at baseband was a problem for several experimenters including the Government of Ontario, ANCS in Edmonton and during the telemedicine experiment at Moose Factory. Proper grounding, shielded cabling, and careful design were suggested solutions.

System reliability was emphasized by Ken Hauschildt, Larry Desmeules and Robert Dupuy, in order to maintain the confidence and motivation of the system user.

Judy Roberts pointed out the need for back-up communications links for co-ordination. Earl Russell and Robert Dupuy stressed the need to provide 2, 3 or 4 channels per site for future systems.

Other problems which were commented on included:

1) 2:4 wire hybrid and echo suppressors;

2) inflexibility of CTS conference mode and the procedural difficulty of adding an additional participant once the conference call had been established;

3) shipping damage to the equipment;

4) primary A.C. power and voltage requirements (which were resolved by using a power transformer).

In order to restore some balance to the discussion, Earl Russell reminded the audience that in spite of these problems the users were in general very satisfied with the facilities provided.

Attention then focused on the features of the ANIK-B satellite system. Larry Desmeules and Judy Roberts wanted to know what facilities would be available, and the extent to which the design was flexible and could respond to the needs and wishes of the experimenters.

John Day reviewed the transponder parameters and discussed the implications of the 20W satellite transmitter in terms of terminal size, complexity and cost. In general, the use of ANIK-B would require larger antennas for the ground stations.

Glen Chung-Yan (Ontario Government) stressed the need for light and easily transportable terminals for emergency links and his requirements for a signalling interface for mobile radio application.

The problem of communication of information between the various groups and organizations was identified by several people.

Duane Starcher (Memorial U) suggested a news bulletin to summarize problems/solutions so that later experiments could exploit the knowledge gained from the earlier ones.

Robert Dupuy (UQ) suggested that meetings such as this one between experimenters throughout the program would have helped identify and resolve problems more efficiently.

As a closing comment, Doug Towers stressed the need for 'off-line' testing and the need for qualified technical support to respond to day-to-day problems.

The session was concluded with a brief summary of the meeting and the main conclusions by the session Rapporteur.

3.3 AUTHOR'S COMMENTS

The rapporteur's report reflects the general tenor of the session; that is, a general satisfaction with the video system and difficulties with the telephony system, almost invariably.

What was not emphasized at the meeting were the problems encountered due to the poor reliability of the small terminals. Since the terminals were prototypes, the need for some debugging of the terminals was recognized, and time was included in the schedule before experiments were to begin. The process was more time-consuming than anticipated and, as a result, some of the first scheduled experiments were delayed by two or three weeks while modifications were made to the terminals and proven out.

All the major experiments were affected in some way by the poor terminal reliability. The impact was minimized by a major effort on the part of DOC to respond as quickly as possible with repairs or replacements for defective units. The fact that these problems did not loom large at the meeting indicates either DOC's success in dealing with the emergencies as they arose or the experimenters sympathies with DOC's problems.

As noted above, the major technical problems encountered by all the experimenters were associated with the telephony system. While the terminal difficulties accounted for some of the problems, many were associated with the experimenters' equipment, be it speakers and microphones, computer terminals, facsimile, slowscan TV or the switched network. Consistent with the DOC policy of not taking responsibility for making the experimenters' equipment work, the onus was on the experimenters to cope with them. In general, the approach seems to have been a good one in that the experimenters gained considerable first-hand experience. Had DOC had the resources to design all systems and make them work, the knowledge would have resided largely with DOC.

One comment referred to the severe constraint of having to use pre-designed technology. The major technological constraint lay in the types and numbers of terminals allocated to each experiment which determined whether the mode to be used would be two-way video, video plus voice return or voice only and the number of locations. Otherwise, the system was quite flexible and was uniquely configured for most experiments. There was a general tendency for each experiment to then expand to exploit other options of the system. These add-ons contributed significantly to the work-loads of both the experimenters and DOC but also added to the value of the experiments.

Obtaining adequate technical information of various types was identified at the session as a source of difficulty. This is an area to which DOC devoted considerable effort but apparently more was needed.

DOC efforts at information exchange were referred to in the Administration Section. A technical session was included at one of the experimenters' meetings. The session was poorly attended. The Experimenters' Guide provided

a reliable reference but was often not adequately absorbed. A CRC systems engineer was designated as a consultant for each experiment; nevertheless, technical questions were frequently directed to other personnel, particularly the operations staff. Experimenters were encouraged to contact previous experimenters but infrequently availed themselves of the opportunities. Experimenters were warned of the difficulties of sound systems but tended not to respond until they encountered the problems over the satellite.

There seem to have been several problems involved in the communications flow; viz

1) timeliness: Information provided too soon was not absorbed.

2) The level of technical skills committed by the experimenter was not always adequate.

3) identification of appropriate information channels: Information passed to the wrong person or obtained from an inappropriate source can be not only wasted effort but counter-productive.

It may be noted that a later experimenter had technical consultants, visited other experiments and proceeded with minimal difficulties.

4. SESSION 3 - INTERACTION

Chairman: A. Casey-Stahmer
Lead Speaker: R. Dupuy
Rapporteur: J. Daniel

4.1 QUESTIONS

The concept of 'Interaction' can be defined in terms of the following broad concepts:

1) participation

2) humanizing the interaction

3) communications styles

4) feedback

5) physical facilities, number of participants, etc.

6) hierarchy (added during session)

7) accessibility (added during session)

8) transparency (added during session)

9) symmetry (added during session)

In regard to these concepts the Hermes experiments should provide data for the following questions:

1) How did you make your interaction work? What techniques did you use?

2) Was your system conducive to interaction? Reasons?

3) How important was interaction to your experiment? In what ways did its importance show? In what applications could you have done without interaction?

4) How would you organize the interaction aspects of your experiment if you were to do it again?

4.2 RAPPORTEUR'S REPORT

Anna Casey-Stahmer opened the session by recalling that interaction had been a major feature in the experiment proposals submitted. Was the importance of interaction borne out in the experiments? Other subsidiary questions to be addressed at the session were:

- Could alternative systems be used at lower cost?

- What are the implications of moving from a two-point to a multipoint system as far as interaction is concerned?

- What principles should govern the choice of an appropriate combination of audio and video channels?

- Would a satellite in a broadcast mode with interaction via terrestrial telephone links have been adequate in most cases?

- Would a "push-to-see" facility be useful?

After this introduction, Robert Dupuy presented the interactive aspects of the University of Quebec experiment. He recalled the various types of communication model (see Figure 1) and stated that the Université du Québec had used the Hermes system to simulate a distributed network. Since the terminals available precluded the creation of a pure distributed system, different configurations were set up sequentially to provide a multi-usage network. Fairly sophisticated multi-purpose media classrooms were available at several nodes and communication capacity was augmented by the use of landlines.

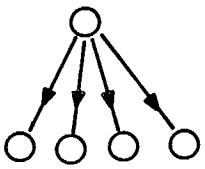
UQ experiments were in four categories:

1) Teledocumentation: In two experiments, the satellite allowed students to discuss needs with librarians and librarians to talk to each other. The aim was to supply students with appropriate reference material.

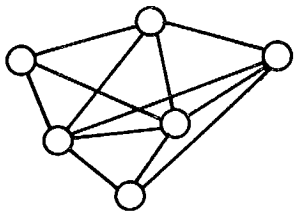
2) Teleteaching: Several experiments covered a variety of approaches from the classical lecture course to a more participative course with resource people at various points.

1. Telephone Model

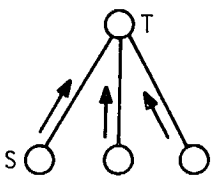
2. Broadcast Model
(canned instruction)

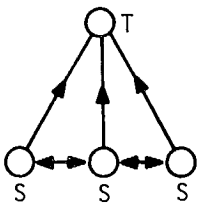


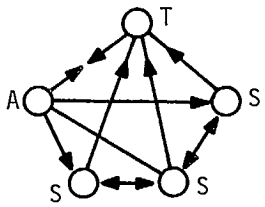
3. Distributed Network



4. Classroom Instruction





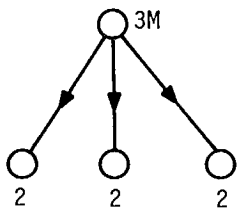


T = Teacher
S = Student
A = Assistant

Increasing Interaction

5. UQ HERMES Experiments

(a) Video
(not a distributed network)



(b) Telephony
(distributed network)

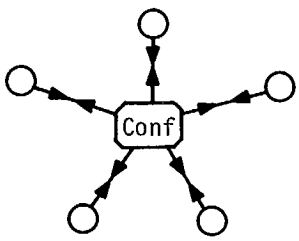


Figure 1. Communications Models

3) Teleconference: Robert Dupuy stressed a most interesting electron microscopy experiment that had been conducted between Montreal, Quebec, Rimouski and Trois-Rivieres.

4) Remote sensing.

In the course of the subsequent discussion, several other experimenters summarized interactive aspects of their projects. Several themes recurred frequently:

Transparency

The degree of transparency required depends on the situation. Where a system will involve regular users, one can expect more in the way of adaptation to the technology than in the case of a succession of one-time users. However the equipment must in all cases be sufficiently transparent to attract users back. The key feature of transparency was held to be high fidelity in sound and vision. At the same time, it was noted that certain non-transparent features, such as a site hearing its own echo with the satellite delay, can be helpful if the volume is kept very low. Two experimenters remarked that unsophisticated users were often among those least upset by the presence of equipment.

Flexibility

Needs for bandwidth and channel can vary significantly with time even within a single experiment. An ideal system would permit users to adjust capacity to their needs. A tariff structure related to the capacity required would encourage efficient use by making users aware of the necessity to weigh the criteria for good communication in the light of cost-benefit considerations. In many applications a relatively simple system will be perfectly adequate. Two-way video is nice in many applications but is only rarely essential and slow-scan TV can be surprisingly useful. Concerning audio, the issue of open microphones versus other arrangements (e.g. press-to-talk, press-to-activate) came up frequently with most experimenters recommending an open microphone arrangement where possible. However, it was generally felt that a "press-to-see" facility enabling a given video channel to be used in different directions at different times would be very useful.

Gate-Keeping: The Formalization of Communication

Any technological system will tend to lead to a certain degree of formalization of communication. Some types of communication, such as medical consultation, are already highly formalized and are little affected by the added constraints of the satellite link. However experimenters believed that there should be as little extra formalization, in the shape of gate-keeping by local group leaders, as possible. The hierarchy present in almost any situation is likely to formalize communication to some degree anyway.

Interaction, Participation and the Relevance of Discussion

All experimenters remarked on the strong influence of the personality of the lecturer or animateur on the degree of interaction. Clearly subject matter and habit will influence the behaviour of participants in any tele-

education activity but seemingly similar situations can produce great differences in the volume and fluidity of interaction in a manner which seems to depend on the personality of the key speaker.

Without giving a formal definition of good interaction, the group agreed that it was unrealistic to expect all participants to actually speak. Levels of participation vary and the silent observer of a discussion can be classed as a participant. In general, experimenters seemed to be against the use of tricks and techniques to promote interaction and doubted their efficacy anyway in the situations where interaction does not take place spontaneously.

Good participation does not necessarily ensure relevant, fluid discussions. The Montreal-Stanford telecolloquium was cited as an example where over-formalized gate-keeping contributed to turning discussion into a series of disconnected statements. The Memorial U and Public Service Commission (PSC) experimenters had noted that in those projects discussions had been fluid and relevant. Comparing the attitudes and behaviour of the two groups in the PSC experiments, Dr. Ryan observed that recruitment procedures, rather than any other factor, explained the greater interaction and esprit de corps in one group.

Several experimenters had noted how some outside event (e.g. technical breakdown, visit of a teacher from another site) could, if it occurred at the right moment, re-invigorate a group and augment both interaction and levels of satisfaction. Experimenters also concurred how difficult it was to prepare groups for satellite sessions until they were able to have "hands on" contact with the equipment.

Optimum Group Size

Relaying a question from experimenters planning a new project in B.C., Anna Casey-Stahmer concluded the session by asking the group for its recommendations on optimum group size in a multipoint conferencing application. Although it was agreed that the answer depended on various factors such as the objectives and content of the project and the prior knowledge participants had of each other, it was felt that the optimum group size lay between 5 and 20. Thus with five sites one hundred participants would be a limit for an interactive session. It was also pointed out that if the number of participants per site was roughly equal better results could be expected.

Conclusion: "It depends"

The session revealed that the answer to any question about the factors and configurations likely to promote high quality satellite exchanges must always be qualified in terms of the particular situation proposed. However, experimenters have built up an impressive amount of know-how in two years of Hermes projects. The evaluators and experimenters face the challenge of distilling this experience so as to make it available to further experimenters.

4.3 AUTHOR'S COMMENTS

This session (and the previous technical session) revealed that experimenters had accumulated considerable knowledge in the use of a variety of interactive systems for various purposes. While many of the observations are

considered to be common sense, they are not generally available from any one source. As a result, Dr. Dorothy Phillips of the CRC Man-Machine Interaction Section has undertaken a survey of the experimenters in order to record systematically some of their observations. The survey is specifically related to aspects of the audio interaction, excluding the video. Information being collected includes a description of the particular system being used, comments on its technical performance, a description of the protocol established to govern the interaction, comments on the effects of interruptions and the satellite delay time.

The B.C. experiment referred to by the Rapporteur has now been completed (see Appendix C). Interaction was an important part of that experiment which seems to have raised as many questions as have been answered. In particular, a problem of too much interaction was encountered. Having been led to expect that they would be able to interact, audience members were frustrated and reacted very negatively when there was not enough time for all to express themselves adequately.

5. SESSION 4 - EVALUATION

Chairman A. Casey-Stahmer
Lead Speaker: R. Roberts
Rapporteur: J. Daniel

5.1 QUESTIONS

The evaluation of experiments is based on four consecutive steps:

1) objective setting (including definition of problem)

2) planning

3) implementation

4) analysis

In regard to these steps, the Hermes experiments evaluations provide information for the following questions:

1) On what basis did you establish the objectives of your experiment? Did everyone in the project agree with them? Is it necessary for all to agree on a set of objectives or is it sufficient to agree on the basic program?

2) Were the evaluation expectations realistic in regard to outcome? Why? Why not?

3) How did you make the steps of the evaluation work?

4) What did we learn in regard to co-operation between evaluators, experimenters, participants and DOC staff?

5) Did your experiment staff and participants support the evaluation and vice versa? Reasons?

6) What did you learn in regard to planning for experiments and the role of evaluation within it?

7) What would you do differently if you were to plan another experiment? What should DOC do differently?

5.2 RAPPORTEUR'S REPORT

Anna Casey-Stahmer opened the session by giving a personal account of the difficulties which she had encountered as the DOC officer co-ordinating evaluation. These can be summarized as follows:

1) The interest of DOC in evaluation and its aims were not fully appreciated by experimenters.

2) DOC could have pursued its interests better by a tighter control over evaluation (e.g. in fixing deadlines and milestones).

3) There was not enough communication with projects about evaluation. More meetings would have helped.

4) Experimenters were not evaluators, so service objectives took precedence over evaluative considerations.

5) Evaluation was only infrequently incorporated into the daily routine of experiments.

6) There was often dissonance between DOC objectives and experimenters' objectives.

7) In few projects was there a commitment to DOC objectives.

8) Projects sometimes changed significantly in the planning stage but the research administrator had difficulty ensuring that evaluation objectives were modified appropriately.

9) In a future project it would be useful to have intensive objective-setting sessions between DOC and experimenters, leading at the very least to an agreement to differ where divergent views are held.

10) A research advisory board is needed to "hold the ring" between divergent interests.

Robin Roberts followed this introduction by discussing four themes related to his experience with evaluating a telemedicine project. He began by suggesting that unrealistic hopes were placed in evaluation. Medical issues should be evaluated by medical specialists and a Hermes evaluation component should take a descriptive look at whether satellites can enable activities of proven medical validity to be conducted quicker and better. He stressed that Hermes experiments were demonstrations, which made for rather

weak before/after research designs. Furthermore many other factors besides the satellite link were changed at the time of the experiment.

Discounting arguments in favour of independence, after pointing out that this was exercised chiefly at the question definition stage, he urged that evaluator and experimenter should be the same person since outside evaluators are rarely accepted into a project team. Turning to the process of evaluation he mentioned certain inadequacies in data collection mechanisms and also the difficulty posed by 'makework' transactions carried out to fill up air time. Finally he urged co-operation between evaluation and experiment at an early stage if both were to attain their objectives.

The ensuing discussion began by contrasting the *expectations* of DOC and the evaluators. Although some evaluators would have liked DOC to be more directive, all agreed that early DOC expectations had been unrealistic in expecting answers to important general questions. Both the nature of the experiments and the size of the budgets involved implied that the aims of evaluation had to be modest.

The question of *internal vs external evaluators* ran through much of the discussion. It was thought that external evaluators were more readily accountable to DOC and less likely to be distracted by operational emergencies. However, experiment leaders must be able to ensure that evaluators are not making unreasonable demands on the time of project personnel. The need for continuity in personnel, which was stressed at the session on administration was felt to argue slightly in favour of external evaluators who would be less vulnerable to being shifted to higher priority activities.

Another recurrent theme was that of *objectives*. Although the objectives of some experiments now read somewhat pompously it was important to remember the much more vague context in which they were written. It is possible that the process of writing saleable funding proposals sometimes took precedence over a search for the key questions. Furthermore at that time DOC's interest in evaluation was not spelled out sufficiently clearly to ensure a good marriage between DOC objectives and those being formulated by experimenters.

Experimenters asserted with disconcerting frankness that in case of conflict, experiment objectives should take precedence over DOC objectives. DOC's influence, it was suggested, lay primarily in its power to accept or reject an experiment at the proposal stage. After criticizing this view as simplistic, given the complex iterative and interactive process implied in the preparation of a good experiment plan, it was urged that greater attention be paid to the experiment selection process in future satellite projects.

A discussion of the impact of evaluation on decision making revealed how difficult it is to obtain consensus around even simple questions. Some saw evaluation largely as formative evaluation for future projects; others expected major value judgements about the social usefulness of satellites and yet others expected illumination on specific policy decisions. One experimenter detected a divergence in objectives between the social and technical branches of DOC where the Hermes project was concerned and this translated into different attitudes to evaluation.

Conclusions: "What are the questions?"

With hindsight it is clear that both the questions asked - and those left unasked - by DOC, the experimenters and the evaluators at an early stage in the project have a lasting influence. In future projects it will be important to establish at the outset, and communicate widely, a consensus on the overall experimental objectives and the key questions to which evaluators should address themselves.

5.3 AUTHOR'S COMMENTS

This session provided a good forum for interaction between DOC, experimenters and evaluators. Evaluation of the individual experiment and of the project as a whole has been a subject that has been difficult to come to grips with. Particularly, in the situation of continuing funding problems, attention of all parties was easily diverted from evaluation to more tangible concerns associated with the experiments. However, it is apparent that to mount an effective experiment that will produce results on which decisions can be based, an evaluation must be an integral part of the planning process; in particular, it must be addressed from the earliest stages of planning and it must be entrused to an individual (internal or external) with sufficient status to have an impact.

As noted in the report, controversial aspects of evaluation begin with the selection of the experiments. The selection process chosen by DOC (an independent evaluation committee making recommendations to the Minister) proved to be a good one from the DOC perspective. By adhering to the recommendations of the Evaluation Committee, DOC was relieved of the necessity to respond to many of the pressures to modify or expand experiments, to add new experiments or to transfer sponsorship. At the same time, DOC's involvement in the direction of the experiments did not end with the selection process but continued as the experiments developed. In addition to the natural evolutionary process, experiments were modified in response to available funds, to the impact of new personnel being added to a given team, or to reorganization within sponsoring institutions. There was also a tendency to augment experiments by inclusion of aspects of other Hermes experiments or as a result of increased awareness of the potential of the technology. Each of these modifications should have involved a joint evaluation between DOC and the experimenter, while recognizing that this would have to be timely in order not to reduce the capability of the experimenter to adapt to a new situation.

DOC obviously should not ignore the advice given at the meeting to pay greater attention to the experiment selection process in future satellite projects. In particular, DOC should carefully consider the suggestion that some sponsors of proposals were likely to receive assistance from DOC permitting them to submit more acceptable proposals.

One aspect of experiment selection that continues to be debated within DOC is the value to DOC and to the sponsoring organizations of having an experiment repeated by different groups, particularly where resources are limited. On the other hand, repetition may be seen as duplication and hence unnecessary. On the other hand, repetition by different groups permits more

direct experiences to be realized and may also result in differing results because of different contexts.

Anna Casey-Stahmer later developed guidelines for project planning and evaluation which she presented at the ANIK-B Information Exchange Meeting. They are stated briefly as follows:

1) Evaluation and program planning should go hand in hand from the beginning.

2) The initial objective-setting phase is extremely important and should involve evaluation to ensure that the objectives are "evaluatable". A series of "rap sessions" with all concerned should be held to establish project objectives.

3) These objectives do not have to remain fixed until the end of the project. Discussion and consultation with everyone concerned in (2) including the evaluator should take place when changes are required.

4) Evaluation should have milestones corresponding to project milestones so that data collection will be orderly.

5) The evaluation needs to have the support of all project staff. This may best be accomplished by setting up a group comprised of representatives of all project "participants" (in the larger sense) so that the whys and hows of evaluation are understood.

6. CONCLUSIONS

This report has presented an overview of various aspects associated with the process of implementation of the Hermes experiments as seen from the point of view of both the experimenters and DOC. The information provides valuable guidelines to DOC for on-going implementation of the Hermes program and for planning the next generation program - the ANIK-B pilot projects. It is expected that it will also provide useful background for participants in these and similar communications projects.

APPENDIX A

Activities Generated by the Hermes Social Experiments

1. The audio link connecting the nursing station at Kaschechewan and the Moose Factory Hospital was extended to provide service on a continuing basis. A facsimile capability was added for transmission of documents. The satellite link was discontinued when regular telephone service was introduced.

2. Université du Québec

   a) An interactive two-way video network has been installed connecting units of the Université at Rimouski, Trois-Rivières, Montreal, Chicoutimi, and Quebec. The Hermes experiments in tele-teaching and teleconferencing accelerated the institutionalization of this mode of communication.

   b) Research is continuing in intergroup communications, community interaction and teledocumentation, areas in which the experiments suggested that the technology might offer solutions for serving needs.

   c) The technical problem of interfacing the terrestrial telephone system with the satellite systems prompted the development in collaboration with the firm C.J. Vanier Associés du Québec of a 2:4 wire active hybrid (the Audiofax HD-50). This equipment is now used in all the video rooms of the Université.

3. Government of Ontario

   a) A low-cost terrestrial voice teleconference pilot project has been initiated between Toronto and Thunder Bay with the possibility of being extended to other centres.

   b) The feasibility is being studied of offering Ministries and agencies a common service teleconferencing system, which initially would provide audio contact, plus high-speed document transmission service and possibly, a slow-scan television capability. The study will assess the transportation, time and other savings which would be realized through such a service. The utility of high-speed facsimile and slow-scan video transmission is an important dimension to the study.

4. Memorial University

   a) The microwave system installed in St. John's in connection with the Hermes experiment is being used for ongoing activities, primarily of an educational nature.

b) Plans are being made to re-install and expand a telephone teaching network, and to experiment with other models of slow-scan video transmissions.

A P P E N D I X B

List of Attendees

Lew Carey Earl Russell	University of Western Ontario
Emerson Johnston Borys Koba	Bell Northern Research
Max House Ken Hauschildt Judy Roberts Duane Starcher	Memorial University
Doug Towers Glen Chung-Yan	Government of Ontario
Mike Ryan	Public Service Commission
Stu Patterson	Carleton University
Larry Desmeules	Alberta Native Communications Society
Henri Dupond	Ministère des Communications, Québec
Robert Dupuy John Daniel	Université du Québec
Robin Roberts	McMaster University
Louise Morose	University of Alberta
John Palmer Anna Casey-Stahmer Jacques Langlois	Department of Communications/HQ
George Davies Terry Kerr Doris Jelly John Day Sally Skene Dorothy Phillips Gaetan Theriault Bob Huck Kent Tiedeman	Department of Communications/CRC

APPENDIX C

Résumés of Social Experiments Conducted via the Hermes Satellite

Experiment E-2 - Alberta Native Communications Society

The first phase of this experiment was conducted during the period 19 October 1976 - 26 February 1977. Three 1-metre terminals located at Edmonton, Fort MacKay and Trout Lake allowed the Society to transmit special radio programming from their Edmonton studio to a central location in each of the northern native communities and permitted the communities to interact with each other and Edmonton. A second video phase started 1 August 1977 and was completed 15 December, 1977. Several Federal and Provincial departments and agencies participated in the second phase, which provided video programming from Edmonton to the northern native communities of Fort Chipewyan, Assumption and Wabasca/Demerais. The programs dealt with many aspects of interest to the people in the communities such as housing, health, employment, recreation and entertainment as well as national and local news. In addition, there were school programs designed to help teachers in the communities through the use of television broadcasts of educational materials. As in Phase 1, voice interaction was possible between the Edmonton studio and the audience congregated in the northern communities. A TV receive-only terminal was installed at Grouard towards the end of the experiment.

Experiment F-3 - Public Service Commission, Ottawa

This experiment was designed to assess the viability of using a telecommunications link such as that provided by Hermes for the conduct of interactive training and development activities. The experiment was conducted during the period 12 April - 16 June, 1977, utilizing a 3-metre ground terminal in St. John's, Newfoundland and the 9-metre station at CRC. The St. John's terminal was shared with Experimenter P-1 (Memorial University of Newfoundland), and technical, classroom and administrative facilities at the University were used to link four classrooms of students in Newfoundland with the Bureau of Staff Development resources in Ottawa. A microwave link from CRC to a Bureau training classroom of the PSC in downtown Ottawa completed the loop. By means of multiplexing, each of the five classrooms could receive a video signal from each of the other classrooms. The results of this experiment should allow the PSC to evaluate the effectiveness of training at a distance, and the feasibility of multiplexed, multinode networks for video teleconferencing via satellite.

Experiment P-1 - Memorial University of Newfoundland

The experiment was conducted during the period 28 March - 18 June, 1977. A 3-metre terminal at the University in St. John's was linked with four

2-metre terminals located at remote hospitals in St. Anthony and Stephenville (on the island) and in Labrador City and Goose Bay in Labrador. In this telemedicine experiment, specialists at the Health Sciences Complex in St. John's were able to transmit educational TV programs to doctors and nurses at the remote hospitals, who could then interact with the specialists in St. John's via return audio. In addition, community health education programs (nutrition, pre-natal care, diabetic diets, etc.) were conducted. Another element of the experiment focused on teleconsultation, using slow-scan TV transmissions from Labrador City to St. John's, as well as the regular TV transmissions from St. John's. The transmission of medical data such as EKG, EEG, EMG, etc. was included as an integral part of the medical education programs.

Experiment P-2-3 - Université du Québec

The Université du Québec conducted a series of educational experiments among their various campuses in the Province. One 3-metre terminal and four 2-metre terminals were rotated to the different campuses to provide for different network configurations and to accommodate, insofar as possible, the several individual experiment requirements. The experiments began 19 October 1976, and continued through 23 March 1977. Main campus sites included Quebec, Montreal, Trois Rivières, Hull, Rouyn, Rimouski, and Chandler. Basic experiments included teleconferencing, document transmission and library access, while specific experiments were conducted in the areas of electron microscopy, oceanography, administration, inter-community cultural exchange and teacher training. The Université has been able to gain from the results additional evaluative data to facilitate decisions pertaining to expansion of their existing telecommunications network linking their campuses.

Experiment P-3 - Province of Ontario

The first part of this two-phase experiment concluded at the end of August 1976. The experiment was conceived to allow eight ministries of the Provincial Government to conduct experiments utilizing the interactive audio facilities provided by Hermes and its ground stations. The 9-metre station was used, and four 1-metre terminals were rotated between Toronto and several communities in northwestern Ontario, including Thunder Bay, Dryden, Sioux Lookout, Red Lake, Pickle Lake and Winisk. Experiments included remote computer access, police networking, remote sensing, forest fire management and telemedicine. One interesting and successful test involved the transmission of vital signs from a patient being evacuated by aircraft from a remote site. The transmission was to doctors at a major hospital in Toronto, via VHF (aircraft to ground), Hermes (remote site to Toronto) and terrestrial facilities (Toronto ground terminal to hospital). The second phase of this experiment commenced 23 April 1977 and concluded at the end of August 1977. This part of the experiment was a follow-up to the first phase, to explore further applications for satellite telecommunications systems, including experimentation of audio and video teleconferencing networks for government administration.

Experiment P-6 - British Columbia Ministry of Education

This experiment started October 25, 1977 and continued until December 15, 1977. A tele-education experiment, it consisted essentially of two parts, a video interactive element, and a library element that used video and data transmission. The first part provided for video transmissions from Vancouver via a 3-metre terminal to four 2-metre terminals serving community colleges in Dawson Creek, Kelowna, Chilliwack and Campbell River. At three of these sites the programming response was via the standard telephone circuits to the studios, thence via Hermes to Vancouver. A TV receive-only terminal was located at Pitt Lake, a remote logging camp where viewers could receive the program transmission and interact via radio-telephone. Experiment objectives included a test of the feasibility of using a satellite to meet B.C.'s Distance Education needs, a test of a consortium model of program development, production, delivery, and follow-up of a wide variety of educational, instructional and informational programs, and the development of baseline information to aid the distance education planning activities of the Ministry of Education.

Experiment U-1 - Carleton/Stanford Universities

This experiment began with systems tests in June 1976, moved into full operation on 18 October 1976, and concluded in April 1977. The purpose of the experiment was to evaluate the feasibility of exchanging credit courses between universities remote from one another. Simultaneous TV transmissions of courses from Carleton to Stanford and from Stanford to Carleton were conducted, with student participation accommodated by return audio circuits. Full duplex TV with return audio, utilizing only a 2-metre terminal at Carleton University (and a NASA ground terminal near Stanford) was made possible by special digital transmission equipment developed by NASA's Ames Research Centre.

Experiment U-6 - University of Western Ontario (Telemedicine)

This telemedicine experiment was conducted during the period 19 October 1976 - 26 February 1977. A 3-metre terminal was located at Moose Factory General Hospital on James Bay, a 2-metre terminal at the University Hospital in London and a 1-metre terminal at an isolated Nursing Station at Kaschechewan on James Bay. The experiment was designed to determine whether improved communications among these three levels of health services can significantly improve the delivery of health care to northern and isolated regions. Medical consultants in London received video transmissions from Moose Factory and audio from both Moose Factory and Kaschechewan, which were also interconnected in the audio link. TV transmissions from the operating room in Moose Factory permitted professional supervision of procedures by specialists in London. TV was also used for specialist consultation during patient diagnosis and treatment, psychiatric counselling, and pathology, radiology and dentistry consults. X-rays, ultra-sound images, EKG and other visual records were transmitted by TV. EKG, vital signs and medical documents were transmitted via the audio network. The Moose Factory-Kaschechewan audio link were retained after conclusion of the major experiment activities in order to obtain further evaluative data on the use of reliable telephony circuits in the remote nursing stations.

Experiment U-9 - University of Regina

This experiment connected two widely separated French-speaking communities via simultaneous two-way TV for educational and cultural exchange activity. Zenon Park, Saskatchewan, and Baie St. Paul, Quebec share many common interests and each retains individual differences. The experiment provided an opportunity for citizens of both communities to discuss issues and to participate in problem identification/resolution. The experiment started 15 February 1978 and concluded 15 May 1978.

CRC DOCUMENT CONTROL DATA

1. ORIGINATOR: Department of Communications/Communications Research Centre

2. DOCUMENT NO: CRC Technical Note 694-E

3. DOCUMENT DATE: July 1978

4. DOCUMENT TITLE: A Report on the Process of Implementation of Hermes Experiments

5. AUTHOR(s): Doris H. Jelly

6. KEYWORDS: (1) Hermes
(2) Experiments
(3) Process

7. SUBJECT CATEGORY (FIELD & GROUP: COSATI)

20 Space Technology
20 02 Spacecraft

8. ABSTRACT: In carrying out the communications experiments using the Hermes satellite, considerable practical knowledge was acquired by DOC and by the experimenters about the process of experiment implementation. This Technical Note records many experiences, observations and recommendations regarding the process. It is based largely on a debriefing session of the major social experimenters sponsored by DOC in September, 1977. It is intended as a reference for those involved in planning future communications projects. Topics emphasized in the report are administration, technical aspects, interaction and evaluation.

9. CITATION:

JELLY, DORIS H.
--A report on the process of implementation of Hermes experiments.

Government of Canada Gouvernement du Canada