TELESERVICES VIA SATELLITE

Experiments and Future Perspectives

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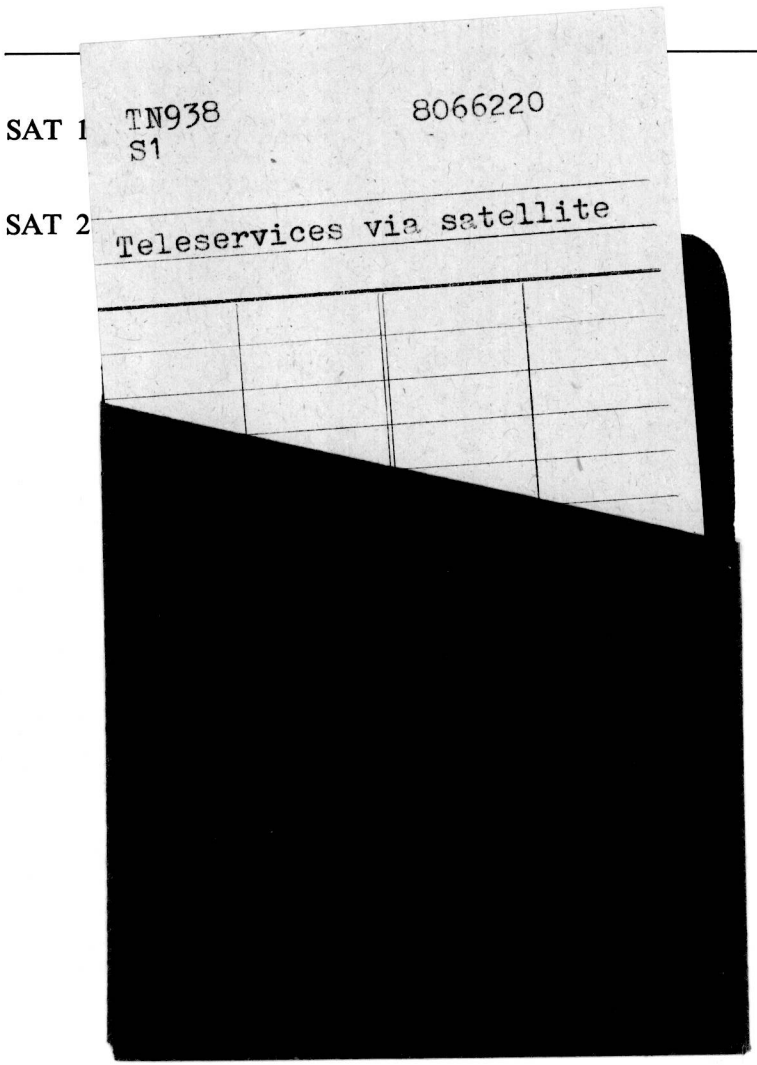
TELESERVICES VIA SATELLITE
EXPERIMENTS AND FUTURE PERSPECTIVES

VIA SATELLITE:

POLICY ISSUES IN SATELLITE APPLICATIONS 2

A series of policy studies exploring the international legal, political and social aspects of satellite applications.



For the future
...Melissa, Arianna,
...Derek, Darcy

FOREWORD

Teleservices via Satellite deals with the harnessing of the technology of space to serve people. The challenge is no longer a purely technical one, for the technology to provide teleservices is here and well defined. Rather it is a challenge to devise new and innovative applications, and this is the subject that Dr. Smith has chosen to address in this volume. It provides an overview of the decade that has been needed to gain a perspective on the experiments and the issues which must be addressed: to understand the purposes—perceived and actual—of the accumulated demonstrations; to assess what their impact has been; to identify what basic concepts have emerged that can guide the future course of experimentation and implementation of new services. Dr. Smith's book will be useful in this regard to both the general public and those who are the potential beneficiaries of these services.

The volume considers—in depth—selected experiments on satellite-delivered social services and their possible integration into society. It depicts the complex interactions of diverse entities, the continual problems of funding for public services, the problems of relevance to needs and meaningful needs assessment, the practical, political, and institutional hurdles to be overcome. The volume brings to light the problems encountered in effecting a technology transfer to provide services for the public sector. It establishes a basis and a rationale to the thesis that coordinated and strengthened leadership are essential. And it develops some of the basic criteria and concepts needed in formulating an effective leadership initiative —all needed if a comprehensive program for satellite applications is to be developed.

In delving beyond the mere description of selected experiments to attempt a generalization of basic concepts, Dr. Smith has contributed an analysis of the problems and issues in their larger context.

Such analysis can build the focus and the perspective essential for future policy and planning. The volume will serve as a resource to students, interested participants in the social application of satellite communications, and policy makers who will make the key decisions that will determine whether or not we will derive the available benefits from the new technology, and whether we will dare to add satellite services to our working tools for the improvement of the human condition.

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PREFACE

There are certain periods of time during which experiments are conducted utilizing a new technology such as the communications satellite when no one is really sure what uses will be ultimately successful in terms of commercial implementation, meeting national needs or goals, or providing public services. Such was the case with the communication satellite experiments of NASA from 1969–1978 which have attempted to meet a variety of perceived social needs. These "user" experiments as they were called began on an *ad hoc* and somewhat serendipitous basis and continued through a period of gradual formalization.

This volume builds on the Epilogue of *Communication via Satellite: A Vision in Retrospect* (1976) where NASA had reached the realization that technical experiments were only one side of communications experimentation and that benefits could be derived from experimentation responding to perceived needs. "Consequently, NASA adopted the view that many potential satellite applications—including interchange of information in specialized professional areas and educational broadcasting to home or community receivers—were important areas for its research and development efforts. Since its adoption, the NASA user experimentation policy has been the cornerstone of the space agency's communication satellite programs."

Thus a new set of visions began to emerge with respect to speculative communication satellite applications which were made possible by the development and flight testing of a generation of NASA applications satellites which, during the seventies, have explored and demonstrated the potential of space communications technology for social services. Significant advances have been achieved in these areas and they have accomplished much more than the testing of a wide variety of possible applications. They have in fact, signalled

the emergence of the new kind of activity which has—in this volume—been termed "teleservices." They have shown that communication satellites and the unique teleservices which they offer to mankind, will make a difference in our lives. As observed by Arthur C. Clarke, the communications satellite is going to have a profound impact upon the future of society—an impact even more spectacular than that of earlier communications innovations such as the printing press and the telephone.

During this experimental period, ideas were rampant, but those who took their ideas, created experiments, and saw them through to completion were few. The early experiments had an "amateur" quality about them in the positive British sense of the word. Hardware was adapted for a variety of purposes and concepts and systems were developed by chance as often as by design. Conceptual studies were undertaken with little knowledge of the effect they would have on a later demonstration program. Even legal and institutional issues were considered which turned out to have a significant effect on the institutional cycle of the space technology integration model and have radically affected the form of the operational systems of the 1970s. What was missing was a comprehensive program for communication satellite development in speculative service areas. Generally, the early experimental community comprised a series of individuals and university-based groups who proposed and undertook experiments on an individualistic and separate basis. Many times there were conflicts between experimental research designs, university interests, funding authority desires and budgetary concerns. However, there was an undercurrent of optimism with regard to the potential of the communication satellite as a means of delivering worthwhile services. During the infrequent gatherings of experimenters in Washington or elsewhere, it was generally felt that there was a need for the experiments being carried out but a lack of a central focus.

The problem was that no one was able to clearly establish who had the responsibility for guiding and standardizing experimental programs. NASA was primarily a technical agency, but its personnel acted as counselors to experimenters in a most positive fashion. Federal agencies such as the Department of Health Education and Welfare carried on fierce internal debates as to the merits of satellite delivery systems. It is to the lasting credit of NASA that throughout this period they continued—eventually through the Office of Appli-

cations—to encourage and support the wide variety of experimenters that came to them.

It was only logical that with the later (and as it turned out because of the 1973 NASA phase-out, the last of a series of satellites, the ATS-6 and Communications Technology Satellite) satellites, the size and scope of the experimentation became larger, funding increased, and experiments became demonstrations which began to evidence a concern with the transition to operational status of the system being tested. "Users" became a real word. Instead of university participants or the randomly selected user involvement of the early experiments, demonstration programs developed user network concepts and the deployment of hundreds of ground stations for some demonstrations. ATS-6 was deployed for a massive experiment in India, and the Communications Technology Satellite provided a number of transnational experiments.

The major difference was that what was speculative in the 60s and early 70s came to be expected and commonplace in the late 70s. Now there is a domestic satellite industry that more and more will circumscribe experimental activities by the simple expedient of providing operational services in various areas. To balance this, in all likelihood NASA will return to a speculative research and development role in the early 1980s, but this time with a comprehensive program base.

One experimental activity that offers a unique potential for future development is the Satellite Instructional Television Experiment in India. Testing the thesis that a communications satellite can greatly increase a developing nation's progress can have significance for the 1980s. During my first trip to India prior to the start of the experiment there was already serious discussion about cultural integrity and possible cultural imperialism, but there was never any doubt that the experiment would take place and that value would be derived from it. Over the next four years, each trip to India produced new insight as to the ways in which parts of the country were changing to accommodate the emergent technological system. The interesting fact is that the demonstration proved to be as successful as it was. Each type of problem that was experienced in the U.S. experiments was evident in India, and yet through a series of institutional changes the programming was produced and transmitted and positively received. Thus, in many ways my visits to India paralleled similar visits to other experimental sites in the U.S., most particularly

the Federation of Rocky Mountain States demonstrations in the western United States. However, meetings with regard to the Communications Technology Satellite activities in Canada began to indicate a coordinated planning approach to the experimentation process that will continue to be relevant to future planning.

From out of the series of individual experiments there emerged a number of institutional responses. The Public Service Satellite Consortium was created and initially contained many of the ATS-6 experimenters. The Public Broadcasting Service perfected its idea of a satellite distribution system to the point of creating an operational network. NASA itself has undergone a number of changes as it re-evaluates its role in the communications satellite area and the private sector has begun to explore the provision of a number of services on an operational basis.

It is in an attempt to chronicle a selected part of this experimental period and project developments into the institutional framework for future experimentation that this book was written. The early experimental period for user demonstrations (1969–1978) has formed a Phase I of a continuing experimental flow. Phase II begins in 1978 and will extend through the 1980s taking advantage of the many opportunities that will be presented by the Space Shuttle and large space communications platforms. There are lessons to be learned from the Phase I experiments in terms of space applications and institutional accommodation. It is obvious that there will be new experimentation but it will emphasize for some time to come improvements of, refinements of, and subtle variations to the basic experiments that have been completed. The basic experimental work has been done and the first chapter of the larger story of communicating via satellite has been written. The question remains as to whether we will be able to benefit from what we have learned and apply its basic principles and lessons to what we must do next. The experiments have provided us with guidelines as to how to structure institutions to provide for a comprehensive program of teleservices via satellite that can effectively respond to the technologic imperative of the 1980s. Thus the experiments can help us find a future perspective for the provision of teleservices via satellite.

The development of a volume such as this required the melding together of the efforts of a number of researchers including C. Swift and M. Rowe, with secretarial support from C. Webster and the cooperation of people involved in the development of communi-

cation satellite applications including A. Calio, N. Hosenball, G. Mossinghoff, L. Jaffe, S. Hubbard, W. Lew, S. Fordyce, R. Marsten, R. Chander, Y. Pal, and B. Blevis. For understanding, friendship, and past kindnesses I acknowledge President D. W. Bowett, Queens' College, Cambridge University, England; Professor R. Y. Jennings, Whewell Professor of International Law, Jesus College, Cambridge; and F.B.C. of Cambridge. This volume in no way reflects the official policy or positions of the National Aeronautics and Space Administration.

For their continuing interest and enthusiasm in this subject area I acknowledge the support of the A. W. Sijthoff Press, and particularly P. Dijkstra, J. H. Landwehr, and N. de Vlam.

Finally I gratefully acknowledge the continuing support of my wife Mary Margaret and the concern shown by my mother Ruth C. Smith.

Madison
January 1, 1978

D. D. Smith

LIST OF ACRONYMS AND ABBREVIATIONS

AANHS	Alaskan Area Native Health Service
ABC	American Broadcasting Company
ACR	Applied Communications Research
AESP	Appalachian Educational Satellite Project
AIR	All India Radio
ANM	Alaska Native Magazine
ANMC	Anchorage Native Medical Center
ARC	Appalachian Regional Commission
ATS	Applications Technology Satellite
AT&T	American Telephone and Telegraph Co.
BPU	Base Production Units
CATV	Community Antenna Television
CEN	Central Education Network
CMI	Career Maturity Inventory
Comsat	Communications Satellite Corporation
COSPAR	Committee on Space Programs for Earth Observations
CPB	Corporation for Public Broadcasting
CTS	Communications Technology Satellite
DAE	Department of Atomic Energy
DOC	Department of Communications of Canada
DOC	Department of Commerce
DOD	Department of Defense
DUT	Denver Uplink Terminal
ECC	Experiment Coordination Committee
EDSAT	Educational Satellite Center
EEN	Eastern Educational Network
EROS	Earth Resources Observation Systems
ESCES	Experimental Satellite Communication Earth Station

ETD	Educational Technology Demonstration
ETV	Educational Television
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FCC	Federal Communications Commission
FRMS	Federation of Rocky Mountain States
HET	Health/Education Telecommunications experiments
HEW	Department of Health, Education and Welfare
HIS	Health Information System
HUD	Department of Housing and Urban Development
IHS	Indian Health Service
INTELSAT	International Telecommunications Satellite Organization
ISRO	Indian Space Research Organization
ITU	International Telecommunications Union
MDS	Materials Distribution Service
MIT	Massachusetts Institute of Technology
MMN	Medical Media Network
MPATI	Midwest Program for Airborne Television Instruction
NACA	National Advisory Committee on Aeronautics
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NCC	Network Control Center
NCET	National Center for Educational Television
NET	National Educational Television
NIE	National Institute of Education
NIH	National Institute of Health
NMAC	National Medical Audiovisual Center
NOAA	National Oceanic and Atmospheric Administration
NPR	National Public Radio
NTIA	National Telecommunications and Information Agency
OSTA	Office of Space and Terrestrial Applications
OSTP	Office of Science and Technology Planning
OTP	Office of Telecommunications Policy
PBS	Public Broadcasting Service
PET	Portable Earth Antenna
PHS	Public Health Service
PISA	Public Interest Satellite Association
PMN	Pacific Mountain Network

POMR	Problem Oriented Medical Record
PSCS	Public Service Communications Satellite
PSCTS	Public Service Communications Technology Satellite
PSSC	Public Service Satellite Consortium
RCA	Radio Corporation of America
RCC	Resource Coordinating Center
SALINET	Satellite Library Information Network
SEARCH	System for Electronic Analysis and Retrieval of Criminal Histories
SECA	South Educational Communications Association
SITE	Satellite Instructional Television Experiment
SSTV	Slow Scan Television
STD	Satellite Technology Demonstration
STI	Space Technology Integration
SUN	Satellite Users Network
SWG	Satellite Working Group
TI	Technology Integration
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USA	United States of America
USSR	Union of Soviet Socialist Republics
VA	Veterans Administration
VERB	Victor Electrowriter Remote Blackboard
VHF	Very High Frequency
WAMI	Washington-Alaska-Montana-Idaho
WARC	World Administrative Radio Conference

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