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ncsl Remote Sensing Project

STATE RECOMMENDATIONS ON APPROACHES TO LANDSAT TECHNOLOGY TRANSFER

Final Report

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For the National Conference of State Legislatures
Under NASA Contract #NASW 2995

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EXECUTIVE SUMMARY

The National Conference of State Legislatures initiated a Task Force review of current and proposed Landsat capabilities for meeting state information needs. Formal testimonies on the states' perceived needs for satellite data were presented by state program managers. These testimonies were additionally reinforced by the response to a survey from 136 state agencies currently using Landsat data. It was concluded that the Landsat technology is capable of providing essential input for policy-making, as well as program implementation in such areas as land use planning, coastal zone management, transportation planning, forestry management, and many critical environmental issues. However, the Task Force strongly emphasized that the satellite technology may not be transferred to state and local government due to flaws in the transfer process rather than in the technology. It suggested some recommendations which could provide for a successful technology transfer process. The following report, supported by NASA Contract #NASW 2995, is an expansion and formalization of those recommendations. The highlights of those recommendations to promote the successful transfer of Landsat technology to state and local government are listed below.

- Effective Communication Links

The greatest emphasis of the recommendations is on effective communication links. A firm, consistent, interactive communication

network is intended by this recommendation.

-The channels of this network should link:

1. NASA with state/local governments;
2. states with other states;
3. state entities within each state, (such as executive and legislative branches, local government and universities); and
4. states with the private sector involved in remote sensing products.

-NASA efforts with the states should be channeled through a specific contact for each state to provide for a coordinated, incisive interaction.

-State awareness of the technology should be focused toward policy- and decision-makers, as well as the program managers because:

1. Information needs differ at the policy and program implementation levels creating a definite need for better information tools for decision-making; and
2. Decisions regarding statewide investment in the technology must eventually be approved by the legislature, so legislators must have straight-forward information on the feasibility of state use before funding decisions can be made.

-A potential direct communication link for immediate feedback between NASA and the states is the establishment of an advisory committee that would meet several times a year. This committee,

comprised of state legislators, governors' scientific advisors, state and local program managers, representatives of inter-governmental organizations, and universities should meet with NASA personnel involved with user assistance and technology applications. This committee could provide a direct voice from the state user community.

-Tools for awareness and updating of the technology's capabilities should include:

1. brochures - for hand-out at general audience presentations,
2. newsletters - to keep all states updated on this rapidly changing technology and its applications,
3. handbooks - at the policy and technical levels to provide guidance in approaching the technology and its uses,
4. state visits - by NASA personnel who can provide personalized, consistent, and effective assistance as needed by the states, and
5. technical training programs - for initial training of state personnel and updating requirements.

It is agreed that these services should be provided by NASA rather than the private sector or universities. An exception is that states generally want to set up their own training programs with the assistance of the universities as soon as they have developed a core capability.

- Product Availability and Pricing

-The federal government should bear the cost of satellite data collection while the program is on an experimental basis.

Once the operational nature of the Landsat Program is firmly established the states are willing to assume a shared-cost arrangement.

-Better means for discovering the availability of products should be established. Information regarding costs, cloud cover problems, and alternatives to available products should be provided to users. This includes types of products available from the EROS Data Center as well as product sources from the array of private sector entities.

Obviously, the states are enthusiastic about their potential use of Landsat technology. However, they are skeptical of the chances for implementation of the technology on an operational basis without a better structured technology transfer process. They offer these recommendations with the hope that NASA can work with them toward a successful implementation of Landsat technology for improved state data collection.

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1.0 INTRODUCTION

The following recommendations have been compiled in response to the concerns of the National Conference of State Legislatures' Task Force on Satellite Remote Sensing (SRS). This Task Force voiced unanimous approval of the continuation of the Landsat Program through the proposed "Landsat D" efforts in their August, 1976 Task Force Final Report. Several types of state programs, as shown in Table I, were found to potentially benefit from the proposed Landsat D capabilities. As a result, NCSL members approved a resolution at their August, 1976 Annual Meeting urging Congressional support for the Landsat Follow-on (D) Program. However, concern was expressed by the Task Force that the feasibility of continuing the Landsat Program is contingent upon the success of the technology transfer process to state and local governments. The focus of these concerns can be generally expressed in terms of these issue areas: user needs, in terms of awareness, technical capabilities, and training; product availability and pricing; and roles and communication links, in terms of federal and state governments, the private sector, and the universities.

This study was performed to clarify and focus the perspective of the states on these issues. Where possible, alternative strategies for accomplishing the satellite technology transfer for effective state implementation have been suggested. Those suggestions are based on the recommendations offered to NCSL by the state and local user community.

Task Force members including legislators, legislative staff, natural resource related program managers, and remote sensing data application specialists from 24 states, as listed in Table II, helped formulate the recommendations. In New York, Illinois, Missouri and Texas, expanded representative groups such as the Remote Sensing Committee of the Texas Natural Resources Information System (TNRIS) Task Force, have contributed their views. The consultants offered their thoughts and recommendations on what they considered top priority issues, so there is not a comment from each participant on every issue presented in this report.

TABLE I

Types of State Programs to Potentially Benefit From Landsat D

Land Use Planning

Wetland Management

Coastal Zone Management

Forestry Management

Fish and Wildlife Management

Transportation

Land Reclamation

Floodplain Management

Water Quality Management

Agriculture

TABLE II

Contributors of the Recommendations
Expressed in This Report

ALABAMA	Walter Stevenson	Alabama Development Office
ARIZONA	Sen. James A. Mack	Arizona State Senate
	Michael S. Castro	Remote Sensing Specialist, ARIS
ARKANSAS	Richard A. Watson	Ozarks Regional Commission
	Ben Clardy	Arkansas Geology Commission
CALIFORNIA	Larry Baird	Executive Secretary, Assembly Science & Technology Committee
	Albert Landini	Associate Planner, Los Angeles Department of City Planning
	Bob Testa	Senate Committee on Natural Resources
COLORADO	Rep. Gerard Frank	Colorado House of Representatives
FLORIDA	Jon S. Beazley, P.E.	State Topographic Engineer
GEORGIA	Jim Fisher	Planning Director, Department of Natural Resources
	Bruce Rado	Senior Planner, Department of Natural Resources
IDAHO	Paul Cunningham	Bureau of State Planning
	Chris A. Korte	Ada Council of Governments
ILLINOIS	Ted Haines	SIMPAC
	James D. Kent	Office of Auditor General
IOWA	Bernard Hoyer	Iowa Geological Survey
	Rep. Andrew Varley	Iowa House of Representatives
KANSAS	Bruce Waddell	Game Research Biologist, Kansas Forestry, Fish & Game Commission
KENTUCKY	Birney Fish	Executive Assistant Department of Natural Resources
LOUISIANA	Dr. Whitehurst	Governor's Scientific Advisor
MARYLAND	Del. J. Hugh Nichols	Maryland House of Delegates
	Edwin L. Thomas	Director, Comprehensive State Planning

MISSOURI	Chris J. Johannsen	University of Missouri, Columbia
NEW HAMPSHIRE	Rep. Chris Spirou	Minority Leader, New Hampshire House of Representatives
NEW YORK	Charles R. Guinn	Policy/Planning Director New York State Energy Office
	Peter C. Brown	Assembly Ways and Means Committee Staff
	Peter Hickey	Staff Director for Senator Bernard C. Smith
NORTH DAKOTA	A. William Johnson	Director, Regional Environmental Assessment Program
	Leroy Klapprodt	North Dakota Water Commission
OREGON	Brent Lake	Land Conservation and Development Commission
SOUTH DAKOTA	Paul Tessar	South Dakota State Planning Bureau
TEXAS	Peggy Harwood	General Land Office
	Ed Barron	Chairman, Remote Sensing Committee
	Jerry Wermund	Associate Director Bureau of Economic Geology
	Alex Opiela	Deputy, Texas Air Control Board
	David Ferguson	Secretary, Texas Natural Resources Information System (TNRIS) Task Force
	Sam McCulloch	TNRIS, Systems Central
	John Wilson	TNRIS, Systems Central
	Charles Palmer	TNRIS, Systems Central
	Jim Watson	TNRIS Remote Sensing Committee, Texas Forest Service
	Ward Goessling	Governor's Office of Budget & Planning
	Joe C. Moseley	Director, Texas Coastal & Marine Council
WASHINGTON	Mike McCormick	Office of Community Development
	Victor Moon	Legislative Analyst, Senate Research Center
WISCONSIN	Allen Miller	Land Use Coordinator, State Bureau of Planning & Budget

2.0 THE STATES' PERSPECTIVE ON THE ISSUES

2.1 Technology Transfer Needs of the States

Increased understanding by the states of current remote sensing technical capabilities, their applications, and specific training programs are needed before satellite remote sensing can be successfully transferred there. Well established communication links between NASA and the states, between the states, and within the states is a key to effective transfer. Within each there needs to be common understanding of state information needs as a whole with a unified effort to meet those needs. Each state needs to be aware of other states' attempts to utilize satellite technology to be able to learn from those states' successes and failures. NASA must have particularly strong communication links with the states to provide the entire state community with • awareness and updating of the technology, • assistance on approaches to using the technology to best meet state needs (in terms of necessary input data, data manipulation processes, and desired output products), and • provisions for training state personnel in the use of the technology. Specific state recommendations to NASA regarding their perceived needs follow.

2.1.1 Better User Awareness

All contributors agree that further information on the Landsat Program is essential to the states on a continuous basis to expedite and facilitate the operational use of satellite data. Suggested formats for such information include brochures, newsletters, handbooks, and personal

visits by NASA representatives. A more detailed description of each of these approaches is discussed separately.

2.1.1.1 Brochures

As a communication tool it is suggested that straight-forward, concise one-page fold-out brochures providing a general overview of the Landsat Program and its state applications be made available for a general audience. These brochures should have the name and address of a specific person or office, such as User Affairs or Public Relations, to contact for further information. They should be distributed to audiences of Landsat presentations to provide a tangible reference to the programs. Without a follow-up mechanism, audience members often lose the message of a presentation. Their interest fades away as they resume their daily schedules with no means to follow-up on questions or interests that may have been sparked by the presentation. A brochure could serve as a reminder of the message and provide a link to further information when used in this manner. As an example, a Science and Technology Exposition was recently held by the State of California at which a Landsat presentation was given. The audience displayed alot of interest combined with frustration in attempting to understand much of the presentation. A brochure describing the Landsat concept in layman's language and offering a source for further information would have been a useful accompaniment to this presentation. Most commentors recommend that these brochures not be mailed out randomly because such mail items tend to go unnoticed. As just described, brochures are an effective reminder of a personal message, but tend to be too brief to introduce awareness on their own. Complaints are numerous of the

piles of unsolicited "junk mail" in state offices.

2.1.1.2 Newsletters

Currently, the active state user community is scattered among state, regional and local agencies in which activities are numerous, varied, and typically have built-in time deadlines. With few exceptions, communication links between agencies within each state are limited and updates on activities in other states are even more difficult to obtain. At the same time, satellite remote sensing applications are rapidly expanding and techniques are changing. It is therefore no surprise that the majority of those consulted strongly urge the circulation of newsletters to keep the user community updated on changes in the technology and its applications.

Opinions on what the newsletter should contain vary slightly. Requested most often is a brief, monthly update, written in layman's language, describing "who is doing what" with Landsat data and who to contact for more information. A 1-3 page newsletter, with printing on front and back, is most likely to be read on a monthly basis. It is suggested that it be focused on a specific application area each month, e.g., land cover identification. The newsletter should contain updates on who is using Landsat and their approach, any pertinent changes in federal or state legislation, and news from the private sector. To be considered credible by the user community, quality of subject matter should be emphasized, rather than a "slick" appearance. Such a monthly update could also be used to update the user handbooks described in the next section.

A second approach includes the circulation of a general newsletter just described, but expands upon it. This approach would add quarterly update on technical subjects surrounding Landsat applications. Its audience would therefore be a subset of the monthly newsletter audience. This publication would be more substantial in size than the monthly update due to its period of circulation and content and as such, should contain an "executive summary" of its contents. It would provide information on new hardware/software products available as developed in various agencies, universities, and the private sector and disseminate new approaches developed for using Landsat as a tool in problem solving. Again, names of contacts for further information should be included.

There are a number of existing newsletters focused on satellite remote sensing cited as worthy examples by the participants. Some states already heavily involved in the use of Landsat data publish their own newsletters such as the quarterly *Texas Natural Resources Information System Newsletter*; *Pixel Facts*, the bi-monthly newsletter of the Pacific Northwest Regional Commission project; and the REAP project of North Dakota's newsletters, *INFOCOM*, a general information update, and *TECHNOGRAM*, a technical update published four or five times per year as needed. Key persons from each of these states indicate that their newsletters are very successful for updates within their states, but strongly emphasize the need for a newsletter to provide information on developments in other states and the private sector. It is also noted that the Bendix Corporation circulates an excellent newsletter, but an unbiased source of information on the capabilities of the

various private corporations is needed.

Without some sort of nation-wide newsletter, information on changes in the technology, applications from state to state, and developments offered from the private sector will continue to appear in a fragmented, random manner. Thus, most state data users will continue to feel that they are struggling alone, uncertain whether their current problems have already been solved by others or that a more efficient approach is available elsewhere. A newsletter from NASA Headquarters providing a broad overview update could help to build and strengthen communication ties and provide some necessary links for effective, timely technology transfer.

2.1.1.3 Handbooks

State officials agree that handbooks describing satellite remote sensing and its applications are very much needed. Further, there are several types of audiences in need of such an information source suggesting a series of several handbooks in varying scope and detail. Such audiences might include:

- policy-makers,
- state and local agency program managers,
- data technicians, and
- the general public.

Each handbook should provide a general overview of satellite remote sensing and a description of its applications for state and local use. The handbook for decision-makers should be brief and focus on applications relative to state policy and program information needs. It should describe the pros and cons of various approaches to data

gathering and remote sensing use available to the state. Where possible, cost comparisons should be made. Data technicians require a step-by-step detailed guide for acquiring, processing and interpreting the data; equipment alternatives and their sources; and output product alternatives.

All of these handbooks should be in looseleaf format so they can be continually updated. It is suggested that the previously described newsletter might serve as an updating mechanism. They should be written in layman's language, graphically informative and illustrate the various costs and benefits where possible. Bibliographic information should be included to provide names of further contacts, other publications and other available handbooks.

Proper distribution is the key to the effectiveness of such handbooks. There should be enough copies so that key people in each state have access to them. Several persons consulted mentioned knowledge of some of the previous handbooks that have been printed but none knew of any within their agencies or exactly where to obtain a copy. The best handbook in the country would be totally worthless unless it is in the hands of appropriate persons, such as chairpersons of natural resources and information needs committees within the legislatures, scientific advisors, and heads of agencies using natural resources related data.

It is suggested that a brief handbook be prepared for the public. Some suggestions, as offered by the TNRIS Remote Sensing Committee should contain examples of the use of Landsat in dealing with current, local issues. To be this specific, such a handbook

would have to be issued through a state agency or a state or regional remote sensing center.

Ted Haines of the Southwestern Illinois Metropolitan and Regional Planning Commission is a typical example of a natural resources data user who experienced a frustrating attempt to find out about Landsat technology. Pressed by the need for land use data over a seven-county region for programs such as "208" planning (from Section 208 of the Federal Water Pollution Control Act) an attempt was made to follow-up on rumors of a new satellite technology. After probing some local universities he discovered the availability of an imagery "browse file" at the regional USGS Center. After making the four-hour trip to the USGS Center and learning how to use the Browse File, he was dismayed to learn that there were hundreds of images available for his area. He then had to determine a criteria for choosing the most appropriate imagery for his needs. After making his choice he discovered that the EROS Data Center in Sioux Falls didn't, in fact, have a copy of that particular scene. It had gotten tied up at Goddard Space Flight Center. After several months and numerous phone calls, he finally managed to purchase his needed data. What to do with the data once he had it was equally frustrating. He managed to make contact with the Bendix Corporation which overwhelmed him with informational materials, films, and sample products. But he had no means for comparing the Bendix proposition with any alternatives. It was even difficult to find out which other companies or universities might offer similar services and with what criteria their offers should be judged once they were discovered. Through his probing, Ted Haines has become convinced that the use of

Landsat would save his agency time and money-if and when he is ever able to achieve a final product. A simple guidebook would have been able to cut down on the fifteen months of time and measureless frustration this potential user has had to experience.

Without such handbooks and their proper distribution, satellite remote sensing will continue to sound like a fantasy to most people. Data technicians will continue to be frustrated when trying to obtain and use the data, program managers will continue to look at traditional approaches to problem-solving, and policy-makers will continue to ignore space technology due to a basic lack of information on its capabilities, applications, and benefits.

2.1.1.4 State Visits by NASA Representatives

Most agree that personal contact with NASA representatives in which two-way interaction can take place is very helpful. It was consistently stated by contributors that these visits should be coordinated within NASA and care should be taken that appropriate persons within each state are contacted. Although there are numerous complaints from many states about NASA's overlapping, uncoordinated, redundant visits, the states of Washington, Oregon and Idaho are examples of states maintaining good interactive relationships with NASA. The coordinated efforts of remote sensing representatives from each of these states acting through the Pacific Northwest Regional Commission have provided a good focal point for interaction with NASA through the Ames Research Center. Representatives from those states strongly recommend that a consistent NASA representative should act as the liaison with each state or group of states. A consistent focal point for interaction

with NASA is important to avoid repetition and confusion for the states. This representative must have the authority to make commitments to the states. NASA must be sure to carry through with those commitments or lose credibility with the state. The point has been expressed by many that it is very easy to lose credibility with a state if any commitments are not carried out.

Visits by state personnel to NASA facilities are also very beneficial. These serve to increase the users' sense of familiarity with the "scientific world" of NASA, including its people and equipment. Such visits open further awareness for the user and provide an opportunity to explore any questions or uncertainties with an array of NASA experts.

2.1.2 Technical Training Programs and Other Local User Needs

The state community is very much aware of the need for training programs to help bridge the technology gap. It is suggested that states becoming newly introduced to satellite technology require awareness training; all states involved in attempting to use the new tool need technical training; and once state and local personnel have been trained, periodic refresher programs are desirable.

Training sessions should definitely be applications-oriented, focused on specific problems of the trainees involved. The costs should be shared, with the actual training provided by the federal government and the cost of trainee time and travel covered by the participating state or local agency. The technical training should offer exposure to the many kinds of hardware/software available. New statistical methods and approaches to problem-solving using satellite

technology should be explored. A "canned approach" should not be used but rather training should be geared to individual state needs within each specific geographic region, where possible. Otherwise the trainees are likely to return to their home agencies, find that their new package does not serve to aid their current problem situations, and feel that their experience was a waste of time. Typically, staff time is not available for researching techniques to rebuild canned programs for meeting real needs. If the transferability is not clearly perceived, it is not likely to occur.

Two existing on-going training programs the states consider feasible are the one at the EROS Data Center in Sioux Falls, and the new program at the Earth Resources Lab at Slidell, Louisiana. The praise for the EROS Program is because training is offered at three levels: 1)for those with no remote sensing awareness; 2)for personnel with an existing, but limited, background; and 3)for updating persons with solid remote sensing experience. The new program offered through the Earth Resources Lab is viewed with interest because of its built-in "hands-on" problem-solving approach. However, states outside the immediate vicinity of these centers require alot of travel expense for training and, more importantly, find they are unable to just "run next door" if questions or problems occur once the trainees return to the job. This accessibility is viewed as an important key to the transfer process. Possibly a two-day follow-up session after six weeks or so would be useful to answer many of the questions that arise. However, the cost of transportation remains a problem.

A more localized approach is offered by the State of Texas

which provides its own training program followed by a brief training session with NASA personnel. These sessions feature the use of existing state agency equipment and expertise as well as capabilities from several of the state's universities. Thus, the trainee learns a new approach for dealing with local problems on existing equipment with the people he will need to work with. Personnel and equipment are immediately at hand for further assistance. Needless to say, Texas is an exception. The majority of states have not begun to develop that kind of capability.

An alternative to these approaches volunteered by many state consultants is the establishment of regionally-based remote sensing centers supported and run by a cooperative of participating state and federal agencies. These could provide for shared cost, easily accessible training and other local user needs, such as updating, a quick-look facility, and on-going advisory assistance. Participating states would provide a built-in commitment without assuming a high risk, high cost burden within the state. Communication links would be stronger due to the necessity of interaction between the participating entities. Such centers would not detract from the establishment of state remote sensing centers and/or natural resources information centers, but rather serve to complement them. It was suggested that, in some cases such as the Pacific Northwest, strong regional commissions already provide a basic network for the potential functioning of such a remote sensing center. Again, the approach should vary to best meet the needs of different states.

Several individually suggested approaches to local user needs

are as fol'ows:

1)-Regional service centers, involving four or five states, might be established and supported cooperatively by such federal agencies as NASA, USGS, and the Census Bureau. combined talents and services of such agencies could therefore become coordinated and centrally located providing accessibility for state data users. Further, other federal funds for programs requiring data products, such as HUD 701 and Section 208 of the Water Quality Act, could be partially channeled through the center. The center could, in turn, use its expertise to produce the needed data product, such as a land use map, for the state or local agency. Such a cooperative center, assuming such coordination on the federal level could be achieved, would thus provide both standardized and specialized products for data users.

2)-The existing network provided by the Cooperative University Extensio. Service of the Department of Agriculture, located in every county in the United States, offers a potential vehicle for local user assistance with remote sensing needs. The purpose of the Extension Service is to respond to local needs as requested. However, the majority of Extension Service personnel would require remote sensing awareness training.

3)-A further suggestion is somewhat of a combination of the first two. It proposes that an assigned group of experts from NASA, USGS, the Census Bureau, etc., be available at

Extension Service Offices on a regularly programmed basis. In this way, expertise on federal programs can be offered to local government through an already existing network.

2.2 Product Availability and Pricing

The existing distribution system through the EROS Data Center is considered workable by the state users consulted. However, there is unanimous emphasis on the need for better turn around time on the data. Data users often do not receive the necessary image or tape until it is too late to be of use. These time requirements vary with each specific need, but most users indicate a needed turn around time of no greater than two to three weeks. The current products available from the EROS Data Center seem to be acceptable but it would be useful to have them geometrically corrected and the bad data points filled in with the next available pixel. Additional products that would be useful include 35 mm slides, line printer outputs, and enhanced prints at a reasonable cost. It is also important that more efficient means for searching out appropriate data products be established in terms of cost, availability, cloud cover, etc.

It is assumed that as long as the Landsat Program is experimental, the direct burden of cost should be on the federal government. The states indirectly share the burden but cannot directly heavily invest in the program until its operational status is assured. State funds are necessarily channeled toward operational needs and are not readily available for research purposes. As long as the Landsat

Program maintains its experimental status, the states, according to the majority of respondents, are not willing to risk funds to develop an operational system. It is agreed by all that once an operational status is assured, a shared-cost arrangement for Landsat products should be employed. The majority of respondents indicate that further research and development should be assumed by the federal government, but the states should bear the cost of reproducing the products and their distribution.

2.3 Perceived Roles in the Technology Transfer Process

Following is a consensus of those views collected from the states regarding the desired roles for universities, the private sector and state legislatures in the technology transfer process.

2.3.1 Universities

In a few states, such as Georgia, good working relationships exist between the universities and state government. However, in most states, communication barriers exist between the university and government entities, such as the legislature and state/local agencies. Although the respondents agree that these barriers should be overcome, the majority insist that for this reason technology cannot be directly transferred through the universities.

The primary suggested role for the university is in the research and development of the technology, its products, and analytical approaches. Most state agencies do not have direct funds available for in-house research. Universities have the built-in responsibility and capabilities for research and in that role are viewed as extremely

valuable by the state contributors. While it is assumed that most university research will be toward the advancement of the technology, it is urged that any such research for the benefit of the state be under the review of a state agency or committee. In this way both the government and the university can work together toward an applicable result. It is also proposed that the universities play a significant role in the training process once in-state training begins to occur. With their built-in expertise, the universities can provide training for updating purposes as the technology expands.

2.3.2 Private Sector

It is agreed that the private sector is invaluable for hardware/software development. Most states do not have funds for such research and development, particularly in terms of hardware. Overall, the states prefer to develop their own capabilities for the on-going use of remote sensing so that their efforts can most effectively meet their needs. But in the interim, which will probably be extensive for most, they are looking to the private sector for analytic products. In addition, it is agreed that development of state capabilities is generally focused on on-going needs so that the many "one-time" products needed will still be contracted out to the private sector.

It must be emphasized, however, that the states generally prefer any interaction concerning technology awareness to be with the federal government rather than the private sector, in view of the profit interests of private business over the interest of states' needs. Training programs and updating are also perceived to be the role of the federal government. Although the majority opinion is that states

would rather deal with the federal government than the private sector in terms of the transfer of this technology, it is felt that the private sector should be encouraged to competitively develop equipment and analysis products to be used at the states' discretion.

2.3.3 State Legislatures

Legislators and state agency personnel agree that state legislatures need to be informed about satellite remote sensing. The primary reasons include:

-potential legislative use of the synoptic view provided by Landsat data for more effective decision-making, and

-the need for legislative support for the use of satellite data as an important data tool providing for more effective natural resources related program implementation.

Legislators require a different form of information for decision-making than program managers require for implementation. Their needs usually involve a general overview of the relevant factors involved in a particular problem area. In 1975, after recognizing the lack of sufficient data for making policy decisions regarding coal development, the North Dakota Legislative Council established the Regional Environmental Assessment Program (REAP). The purpose of this program is to prepare a useful data base for use by the state's decision-makers. Through REAP, a detailed land cover analysis of the state, using Landsat, is being prepared. Other state legislatures, as in California and New York, are beginning to look seriously at data availability for effective decision-making and program implementation. Concern over the definite lack of natural resources data has led all three of these states to

consider the feasibility of Landsat as an important data tool. Other policy issues in which the use of Landsat as an information tool include actions on natural disasters (e.g., extent of flood or drought damage), the need for critical environmental areas policies, agricultural production policies, and growth and development decisions.

Effective program implementation in the states often necessitates the use of satellite remote sensing, as indicated by state program managers such as Charles R. Guinn, Director of Energy Policy Planning and Analysis for New York State. However, legislators must be informed of the feasibility of state use of Landsat data to provide the necessary support and funding for implementation on a statewide basis. Ted Haines of the Southwestern Illinois Metropolitan and Regional Planning Commission insists that, "Landsat programs will never be successful until governmental leaders are able to understand the capabilities of this technology." All contributors agree that, for effective transfer of the technology to the states, an immediate effort must be made to inform the state legislatures, as well as program managers.

Some suggested means of communication include personal contacts with legislative scientific advisors, a brief remote sensing newsletter focused on policy implications, and regional workshops for legislators and staff. These workshops would provide person-to-person interaction with state agency heads to describe state uses, limitations, and costs of satellite remote sensing. Vic Moon, Legislative Analyst for the Washington State Senate Research Center, suggests that key legislators and legislative staff (those involved with natural resources and agricultural concerns), should be the focus of this communication.

Representative Andrew Varley of Iowa, points out the usefulness of bringing together legislators with program managers. That is important, he adds, to most effectively provide awareness and stimulate a unified state approach to use of the technology for successful program initiation and implementation. It is essential that any such activities be closely coordinated with existing remote sensing "focal points" within the states to provide for maximum follow through in each state. The National Conference of State Legislatures is perceived as the primary vehicle for this communication as well as an accepted intermediary between the states and the federal government (NASA is particular), to provide credibility and awareness to both. NCSL plans to do its utmost to serve the information needs of the state legislatures in this matter and strengthen the necessary communication links.

2.4 Summary

The recommendations of the states have directed the need for an effective, interactive communication network. State policy- and decision-makers must have an awareness of the information tool and access to immediate delivery of its products. Program managers need an understanding of the potential of satellite technology to fill their data needs and trained personnel to utilize it. The states must have open and candid interaction with NASA, the supplier of the technology, to guide them in using the technology as a tool and in appropriately utilizing the private sector and universities to fill their needs. Further suggestions for an approach to this kind of communication network are described in Section 3.0.

3.0 OVERVIEW OF COMMUNICATION LINKS

A general picture of current communication links between NASA and the states is presented in Figure 1. For a more effective technology transfer process, some proposed alternatives are presented in Figure 2.

Currently, the states have problems with their own communication links and present a nebulous, diverse user community. At the same time, to most state users, NASA itself appears as a nebulous entity due to its multi-faceted, seemingly uncoordinated approach through its many centers. To help minimize frustration it is suggested that NASA focus its interaction through the User Affairs Office and assign an individual contact for each state. Meanwhile the states should move as rapidly as possible to improve their inner communication and, where possible, establish a representative remote sensing committee or task force in each state for coordinated interaction.

NASA interaction with the states should be shifted slightly to include more exchange with decision-makers and program implementors. The university role should be focused more on technology refinement and product research. Communication regarding applications and training should focus more on the policy/decision-makers and program implementors through the use of previously described workshops, handbooks and newsletters. Without this shift, Landsat will be regarded as an expensive research toy. This type of communication shift has begun

somewhat within NASA with the increased focus on state program needs. It has already resulted in a recent, rapid increase in state use of Landsat. It is essential that NASA carry through further with these shifts in communication to assure on-going acceptance by the states.

The establishment of an advisory committee comprised of representatives from the various state communities such as legislators, state and local program managers, information specialists, and university professors, is suggested for readily accessible feedback to NASA regarding the technology and the transfer process. Such a committee is not to replace NASA interaction with the many members of the user community, but rather to serve as a focal point for direct feedback on user concern.

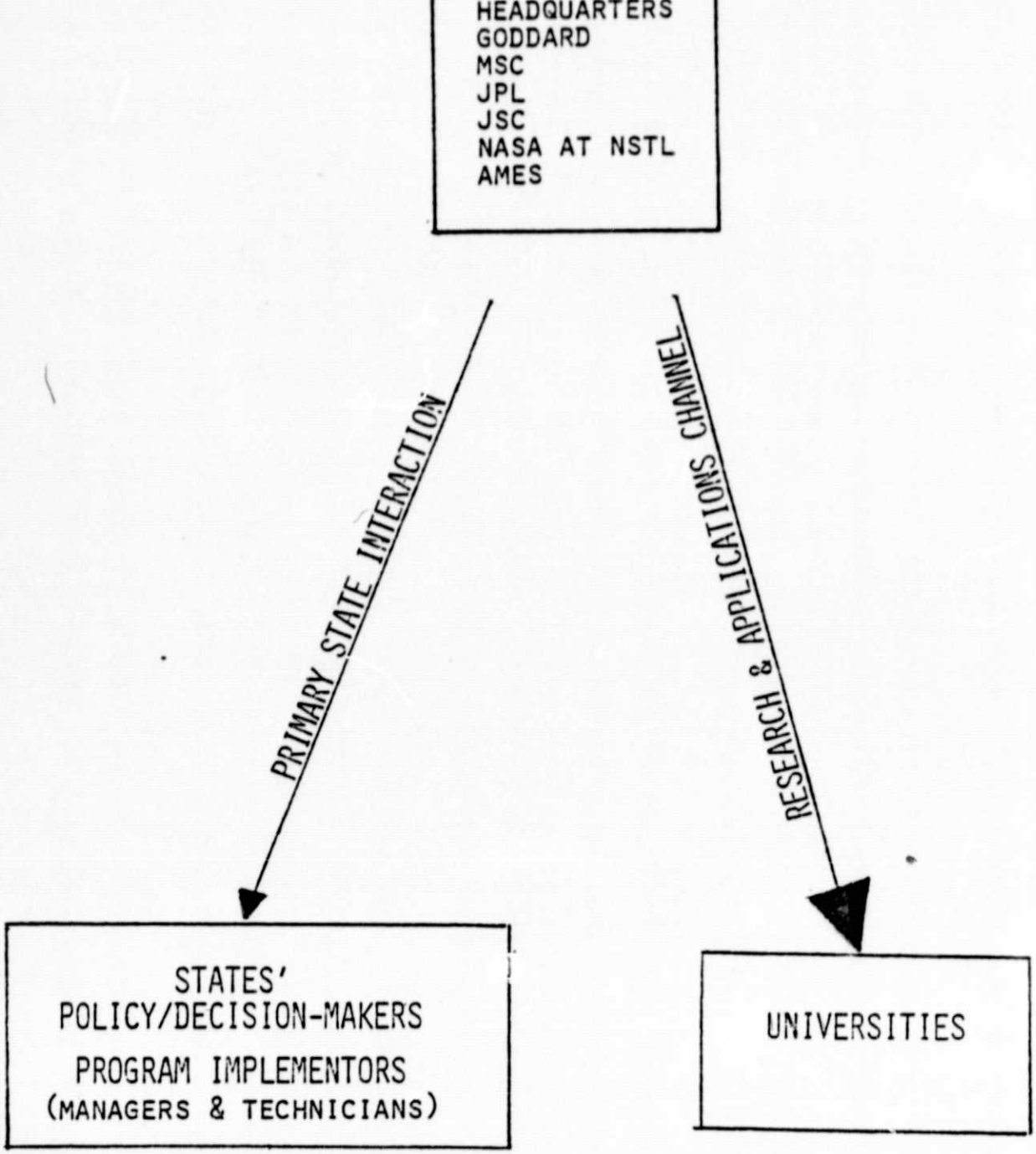

FIGURE 1. CURRENT NASA/STATES COMMUNICATION LINKS

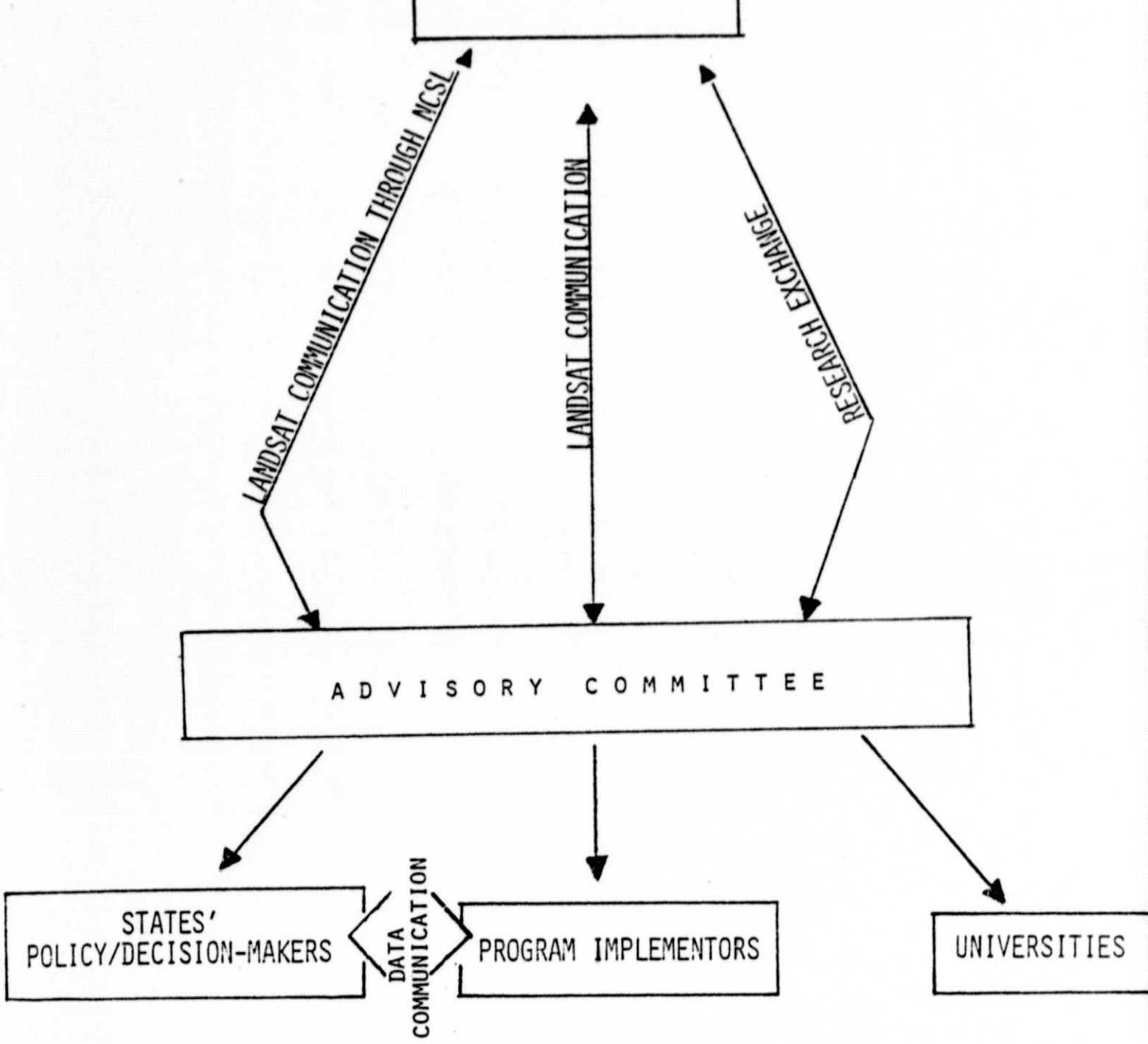

FIGURE 2. PROPOSED NASA/STATES COMMUNICATION LINKS