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I. INTRODUCTION

Since April 1980, The Council of State Governments has served as contractor on a project entitled, "Conduct of a Pilot Study Involving the Domestic Information Display System (DIDS)," under NASA Contract NASW-3368, which calls for the Contractor to "prepare and submit to the Government, a Final Report which documents and summarizes the results of the entire Contract work, including recommendations and conclusions based on the experience and results obtained."

In fulfillment of this requirement, the Council has assembled this Final Report, which consists of five sections. Section I introduces the report and provides a short description of the project and its objectives. Section II summarizes the activities and describes some of the applications for DIDS that have been developed. Section III reviews the areas of state government in which, based on the demonstration, DIDS would appear to have applications. Section IV draws on the experience of the pilot project to offer a number of recommendations about the DIDS data base and the operation of the system. Section V contains some suggestions about the future of the demonstration project and DIDS activities within state and local government.

A. OVERVIEW

DIDS is an acronym that stood originally for the Domestic Information Display System. With the addition of world mapping capability, DIDS was renamed the Decision Information Display System. And with the recent merger of DIDS into the National Indicators System, the system is currently being referred to as NIS/DIDS.

In brief, DIDS is an interactive, computer-based system that can retrieve a wide range of data (demographic, environmental, socio-economic, etc.) from

a large data base and display these data for different geographic units in the form of choropleth maps. A spin-off of satellite technology, DIDS was developed by NASA at the request of the Executive Office of the President. The system was designed to display statistical information in a geographic format for national policy-makers.

When introduced in June 1978, DIDS shared time on a DEC PDP 11/70 computer at the Goddard Space Center. Map displays were generated on a Hazeltine image analysis terminal (IAC-2) tailor-made to NASA specifications and hardwired to the 11/70. System geography, statistics, and operating system and software were stored on three separate disk drives. This prototype system used a data base containing information from the County and City Databook of the United States, geocoded to individual counties.

When the system was first demonstrated, specially balanced video lines transmitted the high resolution video picture from the Hazeltine terminal to a slave monitor in downtown Washington. Telecommunications costs of \$40,000 per demonstration were prohibitive, so most demonstrations were held at Goddard. Later, smaller and cheaper lines were installed to convey video imagery of reasonable quality from Goddard to the Department of Commerce Building.

Initial demonstrations of DIDS led to a one-year period of testing and evaluation by a group of 15 federal agencies operating under White House and congressional leadership. Management and services were provided by the Department of Commerce and NASA respectively.

With the completion of its experimental and developmental phases, DIDS is now operational. Today, 27 federal and non-federal agencies take part in the program and provide funding for it. Management of the system has been moved from the Department of Commerce to the Office of Planning and Evaluation in the Executive Office of the President. Activities of the participating

agencies are coordinated through a Steering Committee; policy direction for the System is set by a smaller Policy Committee whose membership is made up of federal officials.

Now in its second generation, the DIDS system has a fulltime hardware base. The configuration includes a DEC VAX 11/780 computer, associated peripherals, a Conrac color monitor, a De Anza 5512 color image display terminal, a camera, and a xerox color copier. Two remote installations are served by the host computer--one in Washington and the other, which is the object of this report, in Columbia, South Carolina.

This second-generation DIDS system provides single point access to over 4,500 data sets in 22 different agency data bases. SMSA, county, congressional district, and state-level data are interactively displayed against digitized census boundaries. The system also has a polygon-based world map capability and a small cross-national data set.

The host computer for the system has been moved to the Old Executive Office Building. The remote installation has been installed across the street in the New Executive Office Building. Distribution of additional access terminals within the Executive Office of the President has been contemplated. Moreover, three additional federal agencies--the Department of Transportation, the Department of Health and Human Services, and the U.S. Geological Survey--plan to install DIDS computer systems, and other federal agencies are expected to follow suit. Continued reductions in executive agency budgets may, however, inhibit the proliferation of DIDS.

B. THE STATE DEMONSTRATION PROJECT

Although DIDS originated within the federal government and the Steering Committee has been (with the exception of the Council of State Governments)

drawn from federal agencies, the capabilities of the system were seen early to be widely applicable to state and local government. State officials liked demonstrations of the system, and a number of states expressed interest in participating in the evaluation program.

Because system time was committed heavily to federal agencies, widespread state and local government participation was not feasible. Recognizing, however, the potential transferability of DIDS to a non-federal governmental setting, NASA, in April 1980, awarded a grant to the Social and Behavioral Sciences Laboratory of the University of South Carolina to conduct a pilot study involving an on-site demonstration of DIDS. This project, which was a joint undertaking of the University and Division of Research and Statistics of the State of South Carolina, was designed to evaluate DIDS within a state and local government environment. Under a separate NASA contract, the Council of State Governments, a national organization which works on behalf of all branches of the governments of the 50 states, was asked to assist in the design and operation of the South Carolina project and to disseminate the results of the project to interested state officials.

The on-site demonstration project operated by the Council of State Governments and the State of South Carolina was intended to:

- (1) Adapt the DIDS geographic displays and statistical data bases to specific state-level requirements, and assess the effectiveness of the system in these applications;
- (2) Integrate local area geography and statistical data with the DIDS data displays, and apply this synergistic capability to state-level programs;
- (3) Identify generalized state government uses for developing DIDS technology;
- (4) Increase awareness of the DIDS system among a nationwide audience of state officials through established networks of the Council of State governments and other inter-governmental groups;

- (5) Develop general operational concepts for state government for the distributed display and management of integrated data bases consisting of federal and state geobased statistics; and
- (6) Provide recommendations, if required, for system modifications to more effectively meet state needs.

In addition, the project was to examine two levels of data requirements in state government. The first was to evaluate the utility of DIDS for meeting routine data requests. The second was to examine the use of DIDS by policy-makers.

The project's progress in attaining these objectives is reviewed in the next section of this report.

II. ACTIVITIES

Although the Pilot Study Demonstration Project began in April 1980, actual hands-on experience with the system began in late December when the remote terminal was delivered to the Social and Behavioral Science Laboratory at the University of South Carolina.

A. THE SOUTH CAROLINA DEMONSTRATION

One of only three DIDS installations (and the only DIDS installation outside of Washington), the South Carolina configuration is a prototype of the DIDS remote terminal system. It consists of a DEC LSI 11/23 computer with 124K byte memory; 3 RLO1 disk drives with 5.2 M byte capacities; a DEC VT 100 alphanumeric operating terminal; and a De Anze color image display terminal. A Model 2000 Color Graphics Camera System has been loaned to the South Carolina project by the MATRIX Corporation and is used to produce 8" by 10" Polaroid prints and 35 mm. slides.

After operating at the University for almost five months, the system was moved to the Gressette Senate Office Building, immediately behind the State Capitol. Since May 6, 1981, members of the State Legislature, their staffs, the Governor's staff, and employees of state agencies have enjoyed convenient access to the system.

Among the activities and accomplishments associated with the South Carolina pilot study have been the following:

- The South Carolina remote installation has been operated by project staff for several hundred hours. During this time, the system has been experimented with extensively to evaluate its capabilities, and hundreds of maps have been generated. In the course of this activity, staff have gained detailed

knowledge of how the system operates and of its strengths and weaknesses. Comments on the operation of the system will be contained in a separate evaluation report which will be prepared by South Carolina project staff.

- Numerous demonstrations and training sessions have been conducted for state and local officials in South Carolina. Altogether, from January 1981, when the system was put into operation through July, 69 demonstrations were held (see Table One). These demonstrations took 76.5 hours and had an attendance of 203.

Through September 1981, many senior state government officials had been given demonstrations. Among those who viewed the system were Senate President Marion Gressette, House Speaker Ramon Schwartz, Jr., and many other legislators and members of their staffs.

Throughout the operation of the pilot project, individual members of the Governor's staff saw demonstrations of the system. On October 9, Governor Richard Riley was given a special briefing of the system.

- DIDS has been publicized widely in South Carolina. Coverage has included seven television reports. DIDS was featured on a presentation that was telecast statewide during half-time of a University of South Carolina basketball game. More recently, DIDS was highlighted on the regional telecast of the University of South Carolina-North Carolina State football game.

TABLE ONE

South Carolina DIDS Demonstration Project
System Utilization (December 1, 1980 to July 10, 1981)

	<u>Sessions</u>	<u>Hours</u>	<u>Attendance</u>
Demonstrations	69	76.5	203
Training	14	19.0	21
Research	26	36.5	33
Developmental Analyses	3	3.0	4
Slide Production	19	39.0	25
Slide Presentation	2	5.0	2
Grant	3	5.5	5
Color Analysis	5	18.0	8
Print Outs	6	5.8	8
Color Prints, 8 X 10	3	3.5	3
Formal Presentations	11	13.0	1050

Other media attention has accompanied various DIDS-related activities. The demonstration of the system for Governor Riley was reported widely. The Space Shuttle astronauts were given DIDS maps when they visited the University; the presentation of the maps was prominent in reports of their visit. DIDS was featured as the cover story in the May 1981 Carolina Alumni Quarterly.

- Special presentations about DIDS have been made at meetings of government officials, both state and local. Among the groups that have received briefings are the annual meeting of the city and county managers in the state, the South Carolina Assessors' Association, the South Carolina Data Processing Managers' Association (a grouping of state government, college and university data processing managers), the annual meeting of the South Carolina Mapping Advisory Committee (a group that includes representatives of the 24 state agencies involved in mapping; the group's interests cover natural resource mapping, socio-economic mapping and mapping for tax purposes); and affiliates of the South Carolina Census Data Center.
- The system has been exposed extensively to administrators, faculty, and students at the University of South Carolina. President Holderman of the University and several of the University's Vice Presidents have received briefings on the system and subsequently have made requests for information from project staff. Particular interest in the system has been expressed by faculty members from the Departments of Public Health, Government, Sociology, and Geography.

Geography faculty and students have been particularly active users of the system and have produced numerous slides and photographs. Some of this output is being used to prepare a prototype for a State Atlas.

- Programs were developed to re-format various data elements into the standardized DIDS format. Following an extensive keypunch effort to get some data in machine readable format, the data for over 700 variables were sent to Washington for loading into the system.
- A digitizing procedure was developed for putting new geographical data bases into DIDS. This procedure was used to digitize the census tracts of the Columbia, South Carolina, SMSA in DIDS format.

B. PUBLICIZING THE SYSTEM

An important goal of the demonstration project was to foster awareness of the system among state officials in other states. Toward this objective, the Council of State Governments and the South Carolina project staff have carried on a variety of activities. Among these tasks:

- Information about the pilot study has been disseminated through a set of six newsletters which have been published over the life of the project. Copies of each of these newsletters have been distributed to a national audience of almost 800 state officials and other interested individuals. Among the groups which receive the newsletter are:

Governors
State Planning Directors
Commerce Department Secretaries
Secretaries of Human Resources
Secretaries of Natural Resources
State Information Systems Directors
State Data Processing Directors
Legislative Committee Chairmen
for Finance Committees
Legislative Committee Chairmen
for Committees on Administration
or Government Operations
Legislative Staff Directors
for Fiscal Review
Legislative Staff Directors
for Research and Policy Analysis

- DIDS was demonstrated at the annual meeting of the National Conference of State Legislatures (NCSL) which was held in Atlanta in July 1981. The attendance at this national meeting was over 3,000 and included more than 1,800 state legislators and legislative staff members from around the country. For this meeting, the entire South Carolina installation was moved to the Atlanta Hilton Hotel where it worked flawlessly. During the three days the system was operated, several hundred legislators and key staff people received hands-on instruction in the uses of the system.
- In conjunction with the NCSL annual meeting, a workshop session was held as part of the official conference program. This workshop session provided an opportunity to make a formal presentation concerning the operation of the system and to explore a number of issues surrounding the use of DIDS in a state government environment.
- Presentations about the system have also been made at several national meetings and at meetings in other states.

Included among such presentations were sessions conducted at the Harvard Computer Graphics Week (both in 1980 and 1981) and at the annual meeting of the Association of American Geographers. Presentations were also made at seminars on information management conducted by the Harvard Laboratory for Computer Graphics in Chicago, Washington, and twice in Cambridge, Massachusetts. A session on DIDS was given at a conference on the Minnesota Land Management Information System and a presentation was made at the annual meeting of the Southern Juvenile Justice Association held at Saint Simons Island, Georgia, in November 1981. Also in November, DIDS was the subject of a presentation at the South Carolina Executive Forum on Information and Telecommunications Technology in the 1980s which was attended by over 100 business leaders.

- Articles drawing on, and in some cases displaying, DIDS output prepared by the South Carolina project have appeared in several national publications. American Demographer (8/81), U.S. News and World Report (10/5/81), and The New York Times (7/23/81) have all carried articles using DIDS materials. In addition, DIDS provided much of the illustration for the lead article in the November 1981 copy of Scientific American. "The Census of 1980," written by Philip M. Hauser, was accompanied by five DIDS maps produced by demonstration project staff.

C. APPLICATIONS

The potential applications of the system can be illustrated by some examples of specific searches carried out during the course of the demonstration project:

- Project staff did an analysis of the distribution of federal funds for the State Budget and Control Board. This involved retrieval manipulation and display of several categories of 1980 federal funding including energy, defense and education. Several variables were converted to a per capita basis for better comparison. The Budget and Control Board was particularly interested in the impact of proposed federal cutbacks. They were also interested in how South Carolina compared with other southern states.
- A number of maps were prepared for the South Carolina Division of Research and Statistical Services for publication in the annual Statistical Abstract. Most of these have dealt with income and population change between 1970 and 1980. DRSS is using the maps to compare South Carolina with the other states in the region and the nation.
- The Children's Committee of the Governor's Division of Administration used a number of maps to analyze social security payments to children in the state. They were particularly interested in the use of the bivariate function and looked at the relationship of social security payments to the black population.

- The Governor's staff has expressed great interest in sub-county level information on poverty conditions, particularly in rural areas. This would be a major project in the next year when local data are added and a census county division map is digitized.
- The vital records office of the Department of Health and Environmental Control has added several variables to the system and has produced a few maps. They want to update cause of death data from the National Center for Health Statistics and plan to make a major presentation on the use of DIDS at the Southern Health Association meetings next summer in Charleston.
- The Speaker of the House of Representatives used several printouts generated by DIDS for a presentation on stress. He was particularly interested in unemployment, marriage and crime rates. Project staff prepared the information and helped him write the script which he delivered the next day.
- A number of slides were generated for the McCormick County Planning Office which is trying to assess the economic impact of the Richard Russell Dam on the Savannah River. The dam will provide recreational activities and electrical power. The maps have depicted income, population growth, economic activities and the location of the interstate highway system for a 200 mile radius. The zoom image centered on McCormick County worked well.

- The South Carolina Department of Highways and Public Transportation is eager to use DIDS as part of their highway planning activity. Their initial interest seems to be in the northwestern part of the state, particularly Spartanburg. They are most interested in income, population growth and other measures of demand for new highways.

All in all, through the pilot project, DIDS has been exposed to an impressive number of state and local officials, not only in South Carolina but also across the country. Substantial experience has been gained in operating the system, experience which has provided significant insights into the potential applications of the system for state government. Moreover, the demonstration has provided numerous opportunities to gauge the firsthand reactions of officials to the system.

In general, the activities just described confirm the premise on which the project was based: state and local officials who are exposed to the system recognize its great potential utility and express interest in employing the technology for a variety of applications. Some of the areas where the system can be applied will now be discussed.

III. STATE GOVERNMENT USES OF DIDS

The South Carolina pilot project clearly established the usefulness of the system for state government. By observing the reactions of scores of officials from all levels and branches of state government and by examining the specific applications which have been conducted, it is evident that the system has many potential uses. How the system is used will vary from one set of officials to another. Not surprisingly, these different uses carry somewhat different imperatives for the way in which the system is operated and how users gain access to its resources. Nevertheless, the use of geographic displays appeared to be highly congenial to government officials. Data displayed in map formats seemed to be more readily and completely understood than conventional statistical or tabular presentations.

This section discusses the possible uses of the system, describing the capabilities of the system in terms of three broad areas. These areas are:

- A. Information Retrieval and Display
- B. Forecasting and Simulation
- C. Research and Data Analysis

A. INFORMATION RETRIEVAL AND DISPLAY

DIDS capabilities in the area of information retrieval are expressed in the very name of the system (Information Display System). What the name does not express is the wide applicability of this capacity within state government. Potential applications for geographic displays are numerous and can be found at every stage of the policy process from policy formation through policy adoption to program implementation, program operation, and program evaluation. The system can also serve as a source for a variety of information needs.

In the policy formation process, DIDS can function as a decision support

system at different levels. First, the system can effectively give background information to senior decision-makers and their staffs. In this role, it would function at the state level in a manner similar to the one foreseen for it at the federal level. Just as DIDS is going to be used to prepare background briefings for the President and his staff, DIDS could be used to provide an overview to the governor and members of his office, legislative leaders and members of the legislative research staff, senior administration and executive branch personnel in many program areas, state budget and planning officials, and many others. One special case of background usage would be to employ the system to give situation reports. For example, the system could be used to brief a governor during a flood, hurricane or other natural disaster.

Second, the system can be used to display information relevant to the preparation of policy options. When particular policies are being framed in areas such as natural resources, education, human services and criminal justice, information relevant to the proposals can be shown in a fashion readily understood by decision-makers. To take just one example, DIDS could be used to prepare an assessment of the need for remedial education programs. With appropriate data, DIDS could quickly show the geographic areas which contained the greatest numbers and percentages of primary and secondary students whose scores on standardized tests fell below a national (or statewide) average.

At the policy adoption stage, DIDS would also function as a decision support system assisting policy-makers as they weighed policy alternatives. In addition to the governor and senior executive branch personnel, DIDS would be of great use to state legislators and members of their staffs. With its geographic display capabilities, the system could show the impact of policy decisions as they related to the legislators' home districts. In acting as representatives, legislators tend to be especially concerned with the areal

impacts of public policy decisions. Prime among a legislator's concerns is how a proposed policy will affect his or her district and how that impact compares with the policy's effect on other areas.

At the policy implementation or program management stage, DIDS could function as a management information system for decision-makers and program managers. In this regard, the system could be used to display information on program operations (e.g., expenditures by program by area, geographic distribution of government employees by program, number of clients served by geographic unit, volume of services delivered by area). For example, consider the operation of state highway programs. DIDS could show the expenditures for construction and maintenance for primary, secondary, and farm-to-market roads in a given geographic area. It could record levels of local expenditures on roads. It could show the length of different types of roads. It could reveal the distribution of state highway department personnel by county and sub-county areas. It could show traffic flows for particular types of roads or motor vehicle registrations by area. It could report accident rates. Again, with the right data, it could display detailed information for program managers such as sick leave time taken by personnel by area or the distribution of equipment.

This type of information would be of great value to program managers. It would also be of great value to those who exercise oversight over these various program areas, e.g., department heads, legislative committees, the governor's office.

While the system is structured as a general information system, it could also be operated as an umbrella for special information systems. As an illustration, several states have created local government reporting systems for the local governments in their state. These interactive systems can create

and retrieve a wide variety of data (e.g., bonded indebtedness, policy per capita, expenditures on sanitation, type of governmental structure). DIDS could be used in the same manner, offering the considerable additional advantage of its geographic displays. Such a system would be of benefit not only to local governments but also to the numerous state agencies that deal with local jurisdictions, especially state departments of community affairs and offices of intergovernmental relations.

As a retrieval system capable of accessing information from an exceedingly diverse data base, DIDS has a number of generalized references and can serve as a reference tool for many state agencies. The range of potential users is as broad as the users of information in state government and ranges from the governor's press office to the state library. Among the potential users of the system's reference capabilities would certainly be state planning and budget offices, legislative research and service agencies, and the planning and evaluation offices of the various administrative departments.

While there are many prospective uses of DIDS' retrieval capabilities, several factors would condition the actual use of the system, among them considerations relating to access, confidentiality, currency, content and availability.

To function as a decision support or management information system for a senior executive, say a governor, a number of conditions would have to be met. Most important would be that the system was tailored to the personal needs and operating style of the executive or the executive's senior staff. At a minimum, the executive or his/her staff would need to have ready access to a terminal. Searches would have to be confidential. Private data bases may be required to which access would have to be restricted. System security would be important.

To provide direct decision support (as opposed to providing background information for decisions), the data would have to be current. Procedures

would, therefore, have to be established for continually revising and updating the data base. A great deal of information would have to be added to supplement the data already available on the system. Much sub-state data would probably be needed, and the addition of alternate mapping points would probably be required. An easy-to-use system of on-line documentation would have to be developed to supplement the user-friendly features of the current system.

B. FORECASTING AND SIMULATION

Planning has emerged as a major governmental function involving political decision-makers and their staffs and high level specialists. Many activities are subsumed under planning, ranging from short-term policy and program planning to long-term demographic and economic projection. With its geographic display capabilities and large data base, DIDS has wide potential applicability to a range of planning activities within state government. A full enumeration of these potential applications would go beyond the scope of this report. Instead, applications within several areas are mentioned to suggest the range of potential opportunities for using DIDS' capabilities.

Long-Term Planning: DIDS could serve as an important resource for long-term state and local government planning. The system could be used to chart projected changes in population, economic development, and patterns of land use, depicting the results in easy-to-comprehend graphic form. The system would allow planners to project and display the results of alternative assumptions relating to economic and demographic change.

Program Planning: DIDS could be of great value to state and local government agencies in program planning. With adequate subcounty data, numerous applications can be imagined. For example, data relating to school and pre-school children could be used to plan school construction and school closings. Data

on income and poverty could be used to target assistance programs and to locate welfare offices. Health population data could be used to locate clinics and hospitals. In general, DIDS could work as a targeting device to help locate facilities, or direct assistance, or identify populations.

Aid Formulas: Billions of dollars are distributed annually by state governments to local governments in the form of grants-in-aid for specific programs or in general local government support. This allocation of funds to local jurisdictions is, in many cases, based on formulas consisting of one or more variables weighted in some fashion. Among the variables that are often found in state formulas are such measures as population, tax effort, age of housing, poverty-level population, per-pupil average daily attendance and school enrollments. The important policy decisions in many areas, therefore, turn on the construction of the formula, the variables to be included, and the weight to be assigned to each.

With DIDS, policy-makers could get a clear view of how current or proposed changes in a formula will affect local areas. While this would interest all policy-makers, it would appeal particularly to legislators who judge formulas in terms of the impact they will have on their districts. Thus, one can see a strong interest in DIDS' capacity for geographic displays in policy-making in such areas as state education assistance. The preparation of maps displaying alternative formulas could play an important part in policy debates.

Financial Forecasting: Many policy decisions in state government are rooted in financial forecasts that project revenue and tax collections, operating expenditures, and capital spending. These forecasts are at the heart of each state's budget process and set the parameters for overall policy-making. They also have great import for policy-making in particular areas, as for example in projecting state medicaid or AFDC expenditures.

With suitable projection capacity, DIDS could be a valuable tool in financial decision-making. For example, DIDS could be used to prepare estimates of state sales tax collections by county and to prepare maps displaying the results. This would benefit governors, state budget offices, state departments of revenue, legislative committees concerned with revenue and appropriations, and legislative fiscal officers.

Environment and Natural Resources: States carry major responsibilities in environmental protection and natural resource development. With access to appropriate data bases and adequate projection capabilities, DIDS could be used to display the projected environmental and socio-economic impacts of energy development, industrial growth, and large scale public works.

Industrial Development: Virtually all states make strenuous efforts to promote economic development. With the economic, demographic, and land use data, DIDS could be used to target economic development activities in a wide variety of areas, generating results in readily comprehensible geographic displays. By coupling DIDS' capabilities with existing computerized models, DIDS could go beyond targeting to show graphically the impacts of development decisions. Such a capacity would benefit state departments of commerce and agencies concerned with trade promotion, industrial development, environment and natural resources, and community development.

Reapportionment: The demonstration project revealed a very strong interest on the part of state officials in the use of DIDS as a tool in legislative redistricting. Even with its current capacity to display demographic data, DIDS was seen as a valuable reference resource for use in the process of drawing legislative boundaries. With an overlay feature, DIDS could be an even more effective tool for revealing the demographic and political characteristics of different configurations of districts.

With additional simulation and optimization capabilities, DIDS could assist in redistricting even more directly. The system could be used to prepare and display maps based on different criteria. Faced with the 1980s reapportionment, states have spent hundreds of thousands of dollars in creating their own computer systems for redistricting or in purchasing software packages from vendors. DIDS offers a low-cost, and in some regards, superior alternative to the computerized redistricting techniques currently available.

The use of DIDS as a policy planning device would be of greatest interest to policy-makers and their staffs and the senior specialists with responsibilities for planning. The location of the DIDS terminal for such uses will vary from one jurisdiction to the next. Given the political sensitivity of policy planning--such as a projected change in an education formula--confidentiality would be important. A central service agency would probably not be acceptable politically. For such uses, it would be important to put terminals within easy reach of the governor's staff, senior legislators and senior administrators.

For longer term planning purposes, it might be appropriate to locate a terminal within a state planning office. Where a state's legislative research activities are non-partisan, a terminal within a legislative service bureau might be acceptable. The major point is that the closer the use of the system gets to on-going political decision-making, the more political considerations governing its use will come to the fore. Conversely, if access to a system is limited to one or two secluded locations, then the system is not likely to be used for political decision-making.

In any case, for DIDS to be used as a forecasting tool, the system would need to be enhanced. One approach would add software to the system, permitting users to manipulate the data within the system and create new variables.

Another approach would be to create interfaces between DIDS and other systems, so that DIDS could display geographically the results of manipulations performed using modeling programs and software that operate on other systems.

C. RESEARCH AND DATA ANALYSIS

During its operation at the University and in the Senate Office Building, it became very clear that DIDS could function as a major research tool for state government. As a research tool it could be used to do background research and policy analysis in a diversity of substantive areas (e.g., health, finance, natural resources, education). It could also be employed directly in policy-related research in such areas as needs assessment and program evaluation. In all such research efforts, the capacity of the system to give geographic representation to relationships between variables provides a valuable adjunct to standard statistical presentations. With the addition of a statistical package to the system, the system's use as a research tool will be enhanced further.

Potential users for the research capabilities of the system can be found wherever research is conducted within state government. Prominent potential user groups would include, but would by no means be limited to, state planning agencies, legislative research agencies, budget agencies, and offices of planning and evaluation within line departments and agencies. Such a user population would most likely be made up of professionals and technicians who carry on the bulk of research in state government.

The number of terminals that would be needed and where they should be located would be a function of the sources and level of demand. If research becomes the major use for the system, then, at a minimum, a terminal should be made available in a central service location or in the agency which makes the greatest use of the system. Generally speaking, the degree to which the system is used for

research will depend on its availability and accessibility and the degree to which user services are provided.

In summary, the potential uses of DIDS in state government are almost as plentiful and diverse as the uses of information in general, and the options for deploying the system are correspondingly varied. It can function strictly as an information retrieval system or it can work as a powerful tool for planning and research. It can serve as a management information system for senior decision-makers or as a general information tool for all of state government. But the questions of who uses the system, for what purposes, and under what conditions have important implications for the way it is designed. Anyone charged with installing DIDS will have to look beyond the system and its technical capabilities to the personal, organizational, and political environment in which it is to operate.

IV. RECOMMENDATIONS

The statement of work setting forth the objectives of the demonstration project requires that the Council "provide recommendations, if required, for system modifications to more effectively satisfy state needs." Throughout the demonstration project, staff in South Carolina and at the Council have been alert to modifications that would enable the system to be operated more effectively.

As might be expected with a pilot project, a number of potential improvements were identified. For sake of exposition, these potential improvements have been separated into two groups: recommendations concerning the data base and recommendations concerning the operation of the system. The need for many of these recommendations has been noted during the operation of the system at the federal level and, as will be discussed later, are being considered.

A. DATA BASE

Although the technical capabilities of DIDS are impressive, the unique advantage of the system resides in the nature, amount and variety of the data contained in the data base. Containing over 4,500 data sets, the data base is a formidable resource. In the course of operating the system, several needs regarding the data base were identified:

- Subcounty Level Data. For many national purposes, data aggregated at the county level are sufficient. But for state decision-makers, data aggregated at the subcounty level are needed. During the course of the demonstrations of the South Carolina system, a number of officials asked to see subcounty level data. For example, representatives of the Governor's Office asked to see the

distribution of poverty populations within counties. For many state and local applications, then, it would be extremely helpful to enter data at the Minor Civil Division (MCD) and/or Census Civil Division (CCD) level.

- 1980 Census Data. Throughout the demonstrations, the greatest demand from policy-makers and researchers has been for socio-economic indicators from the 1980 Census. So far, the only information available from the 1980 Census has related to population and number of housing units. Several prospective users have commented that they would use the system, but after a more complete set of Census data relating to income, occupation, poverty and housing conditions became available. Interest in access to the 1980 Census is, by no means, limited to DIDS users. Nevertheless, the importance of adding the 1980 data to the data base should be kept firmly in mind as an important priority of the DIDS program.
- Currency of Data. The data for a number of data elements in the data base are not current. In such areas as government, agriculture and manufacturing, for example, the data are more than five years old. The data in the system pertaining to government finances, an area of critical policy concern in the 1980s, are over a decade old. Even a datum such as the 1980 unemployment rate may, for many purposes, not be of much use in the fourth quarter of 1981.

The need for greater currency in government statistics has been discussed widely and goes far beyond the operation of DIDS. Nevertheless, there is a curious incongruity in

possessing a system which has an impressive capability to provide for the rapid display of obsolete information. Furthermore, a lack of current data works against the use of the system as a decision support tool or as a management information system. At very least, there is a need to see that data are entered into the data base as soon as is reasonably possible. Thought should be given in future decisions about the system as to how the data base could be made more current.

B. SYSTEM ENHANCEMENTS

While the system performs well technically, the demonstration project has suggested several changes that would add to its capabilities or make it easier to operate:

- Addition of a Statistical Package. Addition of a statistical package to the system would enhance its effectiveness as a research tool. The system already produces a limited number of summary statistics for single variables. What is needed are several functions that would supplement the bivariate map display. Among useful additions would be correlation and regression procedures and the ability to produce cross tabulations (with associated statistics).
- Better Control of Color Selection and Class Intervals. The default intervals for displaying information are built from national data. These intervals may not be appropriate for displaying data from individual states or substate areas.
- Alternative Mapping Points. The usefulness of the system for states would be enhanced greatly by the ability to

display data for substate entities other than counties. State legislative districts and school districts are only two of the units for which it would be helpful to have display capability. It would also be useful to be able to display data for pre-defined sets of counties such as regional planning districts.

- Planning and Forecasting Capabilities. The usefulness of the system as a device for policy planning and other forms of policy development would be enhanced by improving its capability to create variables. What would be useful in performing projections would be to enlarge the capability to create and construct and store new variables which represent some mathematical function of single variables or combinations of variables already in the system. With such a capacity DIDS could be used in such areas as making economic and demographic projections, forecasting revenue collections, and assessing the effects of changes in the formulas for distributing funds.
- Optimization Capability. Like the forecasting capability, the usefulness for policy-making would be increased if the capability were added whereby the system would produce maps according to predetermined criteria. The use of DIDS as a tool in legislative redistricting is an application of importance to state government. Other applications which would draw on such a capability abound. With such a capability, for example, the system could be used to assist in locating medical facilities, welfare offices, roads and schools, etc.

- Local Data Entry Capability. A major organization problem was encountered during the demonstration project in getting data idiosyncratic to South Carolina converted into DIDS format. It would be more expeditious for state and local government, and reduce the burden on the national DIDS program, if procedures could be established for local data entry. This capability would be almost essential if DIDS were to serve as a management information system; it would also have the useful consequence of increasing the currency of the data base. At the same time, quality control procedures would have to be developed to insure the uniformity and validity of the data.
- Interfaces with Other Systems. In its demonstration phase, the DIDS remote site has run on a dedicated system consisting of the DEC LSI 11/23 minicomputer, a slave graphics terminal, and other peripherals. It would greatly facilitate the use of the system if interfaces could be created whereby DIDS could draw on existing information systems. And, even more generally, it would greatly expand the usage of the DIDS technology if DIDS could be operated on a state or local government's existing computers and did not require the acquisition of a separate system. The development of interfaces with and/or conversions to commonly available equipment would no doubt be difficult. But such an effort would be likely to be repaid by a rapid increase in the use of the technology.

- Hardware Reliability. While DIDS has been very satisfactory from a technical standpoint, several problems have been encountered with the computer system which have left the system down for several lengthy periods. Most of these problems relate to a disk drive that has failed to read correctly, although problems have also been found with the display terminal. These hardware problems have been compounded by inadequate service from the local service office and by awkward maintenance agreements. For the use of the system to become more widespread, reliability will have to be increased and maintenance service will have to be improved.
- Improved Menus. The system is searched through a set of hierarchical menus. Moving up and down the hierarchies is awkward, especially when the user knows in advance the variables he or she is looking for. A procedure for moving directly to a particular known data element would be helpful. It would also be helpful to create standard procedures for branching out of a particular hierarchy. Moreover, the location of the menus on the same disk drive as the system software poses potential operating problems.
- Improved Documentation. The current DIDS data base is not fully documented. This lack of documentation results in a curious inconsistency, given the other capabilities of the system. On the one hand, the system is extremely user friendly, to the point where a new user can learn to operate the system in minutes. On the other hand, making effective use of the system requires an expert knowledge of the

structure and contents of the data base, a knowledge that takes many hours to acquire and requires a considerable familiarity with statistical sources.

For the system to be used widely, there should be made available comprehensive definitions and descriptions of the public use files and their contents. A standardized system of documentation should be developed for each of the available files, one that conforms to the standards being developed for the documentation of machine readable data files in general. There should be a comprehensive data directory which fully describes the individual data elements in the data base.

It would be particularly advantageous if such a system of documentation were made a part of the overall DIDS system so that it could be searched on-line.

It should be noted that the DIDS Program is undertaking steps that will implement some of these recommendations. Among a wide range of activities that are underway, a new data exchange format is being developed which will facilitate local data entry. Statistical capability is being added to the system in form of the SPSS statistical package. An on-line retrieval system containing complete documentation for the data base is being created. The contents of the entire data base are being validated. These and other actions should serve to improve the data base and the operation of the system in areas that were identified during the pilot project.

From its beginnings, a great deal of attention has been devoted to technical aspects of DIDS. Given the experimental nature of the system, this emphasis

is understandable. Yet, these questions are not highly relevant to the community of potential users in state government. Not surprisingly, the concerns of cartographers and computer graphics specialists are not the same as those of government officials. The concern of the government official with such issues as the degree of resolution or the nature of the color palette might increase with exposure. They were not, however, of great interest in initial demonstrations. Instead, officials were far more interested in data and organizational issues. What types of data would be available, how timely would they be, at what level of aggregation could they be displayed--are representative of the questions that concerned users.

In general, then, accompanying the transition of the system from an experimental to an operational status, there needs to be a shift from a focus on technology to a user-oriented outlook. In assigning priority to potential system enhancements, attention should be given to steps that would increase user access and promote ease of operation. Technical refinements may be desirable but are less important than promoting the use of the current system.

V. CONCLUSION

This final section looks beyond the activities of the pilot project to review several of the broader issues surrounding state government participation in DIDS and the future of the state government demonstration project. Indeed, one of the key findings of the demonstration project has been that the organizational issues surrounding DIDS are as significant as the technical aspects of the system.

A. DIDS, COOPERATIVE FEDERALISM, AND FEDERAL STATISTICAL POLICY

Surrounding the question of how states should participate in DIDS have been a number of broader issues concerning the relationship between state and local government, on the one hand, and the federal government, on the other, with respect to federal statistical policy. These issues did not originate with DIDS, nor are they likely to end there. But, because of its association with federal statistical policy, DIDS has been caught up in these broader issues. Should DIDS become the cornerstone of the federal statistical system, as some have suggested, then these controversies will intensify.

In addressing these issues, many state officials have observed that what is called the federal statistical system is really a joint undertaking of all levels of government. Many of the data comprising federal statistics are collected by or with the cooperation of state and local governments. In many instances, state and local governments are required to use federal statistics to comply with reporting requirements under federal grants. Federal funds in many programs are distributed to state and local governments according to formulas which employ data collected by various levels of government.

Generally speaking, state and local governments have taken the view that they should participate as full and equal partners in the design and operation of a system to which they make such a major contribution and which affects

them so greatly. States and localities have felt that they should have a major voice in determining the nature of the data that are collected; they have argued that there should be general recognition of the costs they incur in collecting and reporting data.

To date, policy-making for DIDS from the standpoint of some state observers has reflected the general federal approach toward the federal statistical system. Direction for DIDS is set by a Policy Council made up entirely of federal members. The management plan for DIDS in fiscal 1981, and a draft fiscal 1981-82 policy issues statement do not recognize state and local government as governmental organizations. They restrict direct program participation in DIDS to the federal community.

Many state officials would argue that state and local governments should continue to enjoy access to the system and take part in its development. If anything, the participation of the states and localities in policy-making for the system should be increased. The demonstration project has clearly shown that there is a considerable interest in and need for the products which DIDS can produce. DIDS can serve as a valuable tool for states in meeting their need for access to federal data.

In fact, the demonstration has shown that state use of the system can contribute to the development of the system at the federal level. The reactions of state and local users and the applications which have been carried out offer valuable lessons to the use of DIDS at all levels of government. Moreover, states, by virtue of their experiences with similar systems and with their resources and technological skills, could contribute to DIDS system development.

A particular concern of state and local government has been with the prospective commercialization of DIDS. There has been a great deal of discussion

about turning the distribution of the DIDS software and data base over to commercial vendors. Under one such approach, all non-federal users would be regarded similarly; state and local governments would be treated like potential private sector customers and would have to pay full commercial rates for the system.

Such an approach would be unsatisfactory. It does not properly recognize state and local governments as governmental organizations, jurisdictions which serve the same taxpayers who underwrote the development of the system in the first place. A truly cooperative federalism would mean that, at most, non-federal governmental entities would be available to purchase the software and data base at the cost of reproducing and distributing them.

In short, state officials would take the same view toward DIDS as they take toward federal statistical policy overall; that is, that states should be treated as equal partners within the intergovernmental data community.

B. THE FUTURE OF THE PILOT PROJECT

One area of immediate concern is the future of the South Carolina demonstration project. In pursuing its objectives, the project has demonstrated the potential utility of the system for state and local government use. It has further demonstrated that state and local governments have substantial interest in the system.

But the constraints of the project have been such that the pilot study could not provide a comprehensive evaluation of state government use. Nor was a thorough evaluation one of the project's goals. First, the system has not been in place long enough to allow sustained use. The 13 months that the system has been in operation is not long when one considers the amount of time that had to be given to installation, debugging and staff training. The time of

active use has been reduced by two months due to equipment failures. Moreover, as with any new system, it took some time for publicity about its availability to reach potential users.

Second, the inability to load selected South Carolina data has been a significant deterrent to its use by state agencies. Without these data, state agencies simply could not carry out the work they would have liked.

Third, the lack of substate data and alternate mapping points discouraged use for specific applications. Although impressed with the system's capabilities, a number of prospective users found that the system did not contain the data for their particular needs.

Finally, the short duration of the pilot project prevented some users from developing applications. Lacking assurance that they would enjoy the use of the system for long enough to take advantage of their investment, potential users were reluctant to commit the time and resources to develop applications.

The promising start made by the pilot project and the interest it aroused suggest that there is a continuing and growing need for a demonstration project to be operated on behalf of state and local government. For this reason, the Council proposes that a mechanism be found whereby the demonstration can be continued. The scope of the project should be broadened to include county and city governments as well as the governments of the states and territories.

In addition to providing a more thorough evaluation of the system than has been possible so far, such a project would serve to:

- increase state and local government awareness, knowledge and usage of the DIDS technology;
- provide state and local governments with information about the DIDS technology, DIDS data base and DIDS applications within state government;

- make available the products of DIDS to the state governments of the 50 states, the governments of counties and municipalities, and to the public interest groups that represent state and local government;
- facilitate the establishment of additional DIDS installations by providing information, technical assistance and support services.

The continuing demonstration project could provide users with an array of services. Which specific services are provided would be influenced by decisions made by the DIDS Policy Committee and by the rapidity with which additional installations come into operation. Figure One contains a list of possible services.

The follow-up to the current project should be located at an institution with the financial resources and expertise needed to operate the project. This host institution, which would serve as System Manager, should have a strong commitment to the development of the system and fostering its use within the state and local government community.

To direct such a project, an advisory panel should be assembled consisting of members drawn from county, state and local government and from the public interest associations which represent them. The panel should represent all regions of the country and the major branches and program areas of state and local government. To coordinate the activities of the advisory panel and to provide overall policy direction to the project, a national organization should be selected to serve as Project Manager.

At a later point, when usage of the system becomes more widespread, the advisory panel could become the governing apparatus for a consortium of DIDS users, facilitating the exchange of information, technical assistance, data resources and computer software.

FIGURE ONE

STATE AND LOCAL GOVERNMENT NIS/DIDS DEMONSTRATION PROJECT:
PROSPECTIVE SERVICES

Information Services:

- provide information on DIDS technology (e.g., system design, hardware, software)
- provide information on DIDS data, database, data documentation
- provide information on potential DIDS applications in a state or local government setting
- provide referrals to other federal, state, local government agencies in response to inquiries
- provide information on data standards, documentation standards

Direct Services to State and Local Government Users:

- conduct searches on request and distribute output (maps, print-outs, etc.)
- permit direct, on-site use of the system by other states and local governments
- copy and distribute data base
- copy and distribute data base documentation
- copy and distribute system documentation
- convert data into DIDS format
- distribute updates to database
- distribute updates to database/system documentation

Software and Data Exchange:

- distribute DIDS software, software enhancements
- distribute common hardware conversions
- distribute data conversion software
- distribute databases created by state and local government DIDS installations

Technical Assistance:

- install DIDS software
- install DIDS database
- advise on or carry out software conversion
- advise on or carry out interfaces with other systems
- train in uses of DIDS

As the federal DIDS program has had time to move from an experimental to a developmental and then to an operational mode, so too is there a need to create a way to build on the base established by the pilot project. During its operation, the South Carolina demonstration project has fulfilled effectively its mission to adapt the DIDS displays to specific state level requirements and to assess the effectiveness of the system in performing those applications. It has integrated local data with the DIDS data base and applied this synergistic capability to state level programs. It has increased awareness of DIDS among state officials and has identified uses for the DIDS technology in state and local government. And it has provided the experience necessary to make recommendations concerning the future operation of the system.

The prospects for DIDS usage by state and local government are bright. At the federal level, 27 agencies now participate in the DIDS project. For comparison, the number of potential users in state and local government should be kept in mind. In addition to the 50 states whose structures mirror the structure of the federal government, there are over 3,000 counties and 18,000 municipalities. If even a fraction of these jurisdictions come to use the DIDS system, they would constitute many times the number of current and potential federal users. To assist in the dissemination of the technology at this stage in its use, it is important that there be an on-going project to serve and inform potential users.