E THE WASHINGTON EXPERIENCE (EVALUATION AND SELECTION OF HARDWARE FOR
AUTOMATED, GEO-BASED INFORMATION SYSTEMS)

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Introduction

The Washington experience is still under way and the development of a
Washington geographic information system has been evolving for the past
25 years, when the Department of Natural Resources was formed. This
system has thrust from two different angles: (1) the proprietary need
for information to support the management of five million acres of trust
lands by the Department, and (2) the need for data over the entire state
because of statewide governmental responsibilities. This dual need has
resulted in the development of an inhouse DNR information system to ful-
fill proprietary needs and the recognition that this system must be
expanded into a statewide system to fill governmental needs.

Background

In 1971, the Washington State Legislature assigned to, but did not fund,
the DNR direct responsibility for the operation and development of a
statewide Land Use Data Bank. This legislation was essential for making
a statewide GIS possible, but of equal importance was the experience the
DNR had gained in developing a statewide resource inventory program on
public lands. This experience had an important influence on both the
evolution of DNR's approach to create a statewide geographic informa-
tion system and conception of the operation of the proposed system with
emphasis on the need to make it a cooperative approach.

The 1971 land use legislation directed the department to expand its
existing data base to include all information relevant to agricultural,
forest, industrial, business and community growth with emphasis on
assembling information useful in setting intermediate and long-range
goals. At the time of this legislation, DNR was operating a data base
that had been evolving over a period of 15 years. The department's
remote sensing and geographic data base experience started with the
state land inventory and the origin of the aerial photographic procure-
ment program in 1958. The unique aspect of this inventory program at
this early stage was the means by which the DNR contracted to collect
aerial photography to service the inventory. In order to adequately
photograph the extensive scattered state holdings, the DNR realized
that it was necessary to collect photography of adjacent private lands
and fly these photographic flights cooperatively with other landowners
to make the flights economically feasible (9:512-521).

The DNR's original inventory consisted of producing standard forest type maps and has evolved into a computer-based Gridded Resource Inventory Data System (GRIDS). Several years ago, a digital mapping system was acquired to assist in the department's orthophotographic mapping program and to provide a method for displaying soil and forest productivity maps produced by the Private Forest Land Grading Program. More recently, DNR has been investigating the feasibility of developing a statewide GIS using grant funds from the Pacific Northwest Regional Commission (PNRC). This effort has created the framework of a statewide GIS by completing initial design/planning work, expanding the technical capability for processing geographic data in Washington, and demonstrating applications of geo-processing to resource planning/management agencies (5).

Experience gained during the past ten years has led DNR to believe that a statewide information system, if properly designed, is technically feasible and economically viable. This work has led to the drafting of legislation to create a cooperative statewide geographic information syste m. On January 30, 1981, Senate Bill 3369 was introduced in the Washington State Legislature and calls for the establishment and maintenance of the State Geographic Information Service Center.

The responsibilities of this center include the collection and dissemination of base mapping information, survey information, information contained in the state's Land Use Data Bank, aerial photographs acquired by DNR, names acted upon the State Board of Geographic Names, and geographic information generated by other state agencies, and, if appropriate, federal agencies and private organizations. This service center would operate from a non-appropriated revolving fund, which means the facility would be entirely user-supported. Therefore, unless the system is cost-effective and provides cooperators with required services and products, it will operate successfully. This concept differs from the procedures suggested by Caulkins and Tomlinson, who state that the operators of a GIS be given "direct authority to specify additional data collection programs by other public agencies ... or to modify existing programs of other agencies..." (1:306). Under the Washington concept, the operators of the system and the users of the system would jointly agree to data content, definition and standards. Users would be responsible for data input and update and would be charged for output products/services. In this way, the statewide GIS concept must be cost-effective in the eyes of the user and responsive to the cooperators.

Influence of State Procurement Regulations

In the State of Washington, all purchases of computer equipment including equipment for geo-based information systems, is controlled by, and needs approval from, the State Data Processing Authority. This organization is unique because it reports only to the legislature. The DPA prepares standards and regulations by which computer systems are purchased and operated. The role of the DPA is, at times, controversial, but this authority does insure that computer systems are compatible and are not being installed where they are not needed. Review and scrutiny by the DPA assures a well-planned, designed and operated system.

Feasibility Study

Currently (December 1, 1980 - February 28, 1981), the DNR has a feasibility study under contract. This contract was awarded primarily to investigate the feasibility of developing a new DNR geo-based information system to replace GRIDS, but is being conducted in such a manner as to also take note of the need for a statewide system.

The primary objective of the development work is to investigate the possibility of integrating all existing DNR information systems (GRIDS, TRAX, AIMS) and develop new capabilities for a single, effective management system, thereby allowing the department to be more cost-effective in meeting its goals and objectives. The second objective is to implement a GIS that will also serve needs (not 100%) of other agencies - state, local and federal, and be compatible with similar systems in Oregon and Idaho.

The RFP for this feasibility study calls for a user needs assessment, but this is based on previous studies from two sources: (1) the in-house work done by the Resource Inventory Section staff regarding department needs for a new system done over a period of two years; and (2) Washington State agencies user needs for a statewide system were identified through previously discussed PNRC-funded projects. The feasibility study also will include recommendations for alternative systems which meet minimum DNR requirements in the areas of data base design, analytic capability, input and output capability, and system requirements. Finally, this study includes a cost analysis for each of the alternatives.

System Selection Procedures

DNR selection procedures consist of: (1) careful research into existing system capabilities; (2) user needs surveys within and outside the DNR to match system capabilities and needs; (3) examination of technical operating characteristics of existing systems using a questionnaire sent to vendors; (4) site visits to inplace systems for operational evaluation; (5) review of service record of vendor, and (6) acquisition, service and update costs. This approach allows a thorough examination of system capabilities and design characteristics and their effect on users, a view of the inplace operation of several types of systems, discussions with operating personnel, and a good indication of total long-range costs. The selection process will involve a multidisciplinary staff composed of personnel with a variety of backgrounds in data processing, geo-processing, resource management, and resource applications of geographic information systems. Presently, two options for operating a GIS exist: (1) use existing hardware at one of several state service centers, or (2) acquire a dedicated computer to operate the system. A decision will be made in the near future.

Summary

DNR has been operating an information system to service proprietary needs for 25 years and is now in the process of developing a new inhouse system with the goal of making it expandible into a state system to make common resource data used by all agencies more universally available and compatible. DNR is in the process of conducting a feasibility study to create a geo-based system to serve seven area offices and headquarters personnel. No hardware has been acquired to date, however, two options are being considered. These include the acquisition of a computer or the use of existing service center facilities. In either case, it is envisioned that remote work stations consisting minimally of a CRT, plotter, digitizer and a minicomputer will be tied through a distributed processing network to a main database. Any agency can then tie in and use/add to this state data base.

We make the following general recommendations, but this list is by no means exhaustive:

Administrative --

- obtain approval from executive management/legislature to develop a system.
- transfer the authority to develop the system to technically competent staff personnel.
- seek cooperation from all resource/planning agencies.
- establish system in an environment that allows long-range flexibility, but can meet short-term user project needs.

Technical --

- recognize that your use is unique.
- plan for incorporation of rapidly emerging technologies.
- do not adapt your needs to a rigid system.
- make system easily expandible through rapid cost-effective upgrades to meet changing needs.