State Agency Involvement in GIS

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INTRODUCTION

I was asked to provide a brief overview of what the Indiana State Government is doing in the realm of Geographic Information System (GIS) technology. First, let me provide a brief description of a GIS to provide a common definition to work from. A Geographic Information System is a computer based system designed to capture, store, edit, manipulate and display geographically referenced information. A GIS provides tools for representing the real world as data about locations. A geographic database is a collection of graphic spatial data and non-graphic related descriptive data that are shared and used for multiple purposes by multiple users.

Graphic spatial data, or digitized maps, deals with locations, shapes and relationships among features, and non-graphic attributes, or descriptive data, that deals with the characteristics of the features. Information from cartography, computer aided design and drafting, surveying and photogrammetry, spatial analysis using rasterized data from thematic maps, interpolation from point data, and remote sensing technology can all feed into a GIS.

GIS is a management tool that can be used to support the following:

- Crime Incidence Analysis
- Demographic Analysis
- Economic Analysis
- Environmental Concerns
- Facilities Management
- Health and Emergency Service Planning and Analysis
- Land Use Monitoring and Analysis
- Local Services Planning
- Natural Resource Management
- Real Estate and Land Evaluation
- Reapportionment and Redistricting of Political Boundaries
- Regional Growth Tracking
- Tax Base Evaluation
- Transportation Planning.

The introduction of automation can lead to a review of the whole map-making process, which can also lead to savings and improvements.

DATA PROCESSING OVERSIGHT COMMISSION (DPOC)

The Data Processing Oversight Commission (DPOC) is made up of support staff for four Commissioners. The Commission is mandated to review and approve acquisitions of computer related hardware, software and services within the Administrative Branch of state government, with review role over other branches of state government. Additionally, this office monitors trends and advances in data processing technologies. As the tremendous potential impact of GIS on state government entities became apparent, we began to investigate the technology to determine the most efficient and effective acquisition and utilization of GIS within state government.

State agencies face increasing pressure from federal program requirements, economic development and natural resource management needs. To accommodate these requirements they initiate programs to develop their own GIS. Without centralized coordination, each agency would develop their own systems with different software and standards, with resulting duplication and added cost to the taxpayer.

After researching GIS related developments in other states, it became apparent that to effectively utilize this technology a comprehensive approach would be required. A number of states are well ahead of Indiana in GIS capability. Most of this GIS capability within other states was developed by individual agencies, to address certain issues. A number of significant problems have developed because of this agency or application driven approach.

For example, in the *Wisconsin Land Records Committee Final Report*, it was noted that eleven different entities collect and use the same or similar administrative district information while only three entities used this same information collected by other entities. Seven entities collected and used topography and geology information while five entities used the data collected by others. This represents a significant duplication of effort. The information could be collected by one entity and then made available to the other entities to utilize, thereby saving tremendous resources.

A few of the other problems some states have run into include:

- The source data was inadequate, or photography was not controlled.
- The geodetic control was inadequate.
- The degree of accuracy allowed when digitizing was not stipulated in the contract.
- The collection of the data may have been inadequate for applications requiring more refined detail.
- Various critical issues were not standardized before agencies developed data, such as standard scales to be used, grid coordinate system, or inadequate number of geodetic control points for local entities.
- Diverse systems were unable to "talk" to one another — some systems were proprietary. Without vendor support, very little can be done with the system.
- Inability to integrate the data even if the systems do "talk" to one another, due to the extensive amount of cleanup work required. It is cheaper to redigitize.

- Many basemap layers were redigitized, leading to agencies not accepting another agency's data. The "their-data-is-not-as-accurate-as-mine" syndrome, which leads to perpetual redundant maintenance of the data.

Recognizing the tremendous cost of development of digital data, the main objective for a comprehensive approach for the state would be to minimize the redundant development of digitized data while considering the widest set of requirements for each of the layers as they are developed. All of the data that is developed should adhere to a set of predetermined standards that representatives from all government sectors have agreed are acceptable.

It is recognized that a cooperative partnership must be forged between government entities before an efficient and effective GIS can be developed that can be respond to a number of problems at the overall least cost. The potential uses for GIS technology by any government entity are phenomenal. Consider for a moment how often the government sector deals with geographic location in its everyday functions.

HISTORY

Let me provide a brief history of the development of GIS related capability and interest in state government, to illustrate how we are working towards a cooperative partnership.

Two agencies expressed interest in GIS technology over two years ago — enough interest to acquire some capability. The first agency was the Department of Natural Resources, where the main interest initially for the GIS was for wetlands inventory. A joint Department of Natural Resources and Federal Fish and Wildlife project was initiated to digitize the wetlands in Indiana. As of this writing, the project is still ongoing. The Department of Natural Resources purchased the Environmental Systems Research Institute (ESRI) product ARC/INFO, which runs on a Prime hardware platform, to support the wetlands inventory project.

The second agency extremely interested in GIS technology was the Indiana Department of Transportation (INDOT, formerly the Indiana Department of Highways). The main interest for INDOT was for computer aided drafting and design capability with a GIS underlayer for several specific functions to include planning, congestion analysis, and detailed design of bridges and roads. After an exhaustive review of packages available on the market, INDOT chose to acquire the McDonnell Douglas Graphic Design System (GDS), which runs on a Digital Equipment hardware platform.

STATE GIS FORUM

In June of 1988, the State GIS Forum was organized by the Indiana Department of Natural Resources. The chair position has since moved to the Indiana Department of Environmental Management. The Forum was established to provide an opportunity for agencies to obtain an in-depth review of GIS and some insight as to how a GIS could be utilized within their agency. The purpose of the GIS Forum was to establish a network of individuals and resources for promoting coordination of GIS activities within state government.

Through the Forum, state agency representatives can exchange information on the GIS activities of various agencies with some visibility of current applications and future developments in and around Indiana. The Forum consists of repre-

sentatives from federal and state government, local counties, cities and towns, universities and other interested individuals who gather for presentations by professionals using GIS technology. The Forum conducts regularly scheduled meetings every month in Indianapolis.

Presentations at the Forum meetings have featured such guests speakers as James Setser, from the Georgia Department of Natural Resources; Wayne Savage, of Chelsea International Corporation of Washington, D.C.; Warren Brigham, from the Illinois Natural History Survey; Jim Stout, from the City of Indianapolis (who provided an overview of the IMAGIS project); as well as representatives from various hardware, software, and services firms.

UNIVERSITY GIS ALLIANCE

The University GIS Alliance was formed in early 1989 by Dr. Richard Hyde of Indiana University/Purdue University in Indianapolis (IUPUI). The Alliance is currently made up of five universities: Ball State University, Indiana State University, Indiana University, IUPUI, and Purdue University.

The University GIS Alliance has proved to be an invaluable resource to state agencies by providing a technical capability to draw upon as needed, and providing guidance for policies, directions and aspects of GIS. Alliance members participate in several state groups including the GIS Forum and the GIS Advisory Resource Group addressed below.

The universities provide extensive technical support for efforts currently underway within the Data Processing Oversight Commission. For example, they are providing a technical review of standards and providing suggestions for further development of standards. Additionally, the universities provide support to various efforts in other state agencies.

INDIANA GIS NEWSLETTER

The State GIS Forum, in cooperation with the University GIS Alliance, publishes a monthly newsletter. The newsletter, called the *Indiana GIS*, is dedicated to federal, state, county, city and university Geographic Information System news and events. Articles are welcome, should anyone wish to submit material for publication.

GIS ADVISORY RESOURCE GROUP

In September of 1989, a Data Processing Oversight Commission GIS Advisory Resource Group was initiated. This group was established to provide DPOC and the state of Indiana with broad-based technological and policy input that would help insure that sound recommendations were made on the structures, standards and policies for a comprehensive state GIS. The GIS Advisory Resource Group was assembled to initiate the formation of a partnership between state agencies, local counties and cities, universities, and federal agencies, in order to consider specific requirements of these entities.

Currently, the Data Processing Oversight Commission staff and the GIS Advisory Resource Group are working to develop some essential Interim GIS Standards. It is anticipated that several chapters of standards will be submitted to the Data Processing Oversight Committee in the near future for consideration.

ADVISORY NEEDS ASSESSMENT

During the summer of 1989, the Data Processing Oversight Commission supported the development of cursory needs assessments for a number of agencies. The cursory needs assessments were conducted by Mr. Denis Mudderman of Indiana State University to determine the general data layers that each agency would require. More work needs to be done to determine additional specific requirements for the data layers.

The list of primary agencies involved with the cursory needs assessment included:

- Indiana Department of Commerce
- Indiana Department of Environmental Management
- Indiana Department of Natural Resources
- Indiana Department of Transportation
- State Board of Health.
  The secondary agencies included:
- Animal Health Board
- Bureau or Motor Vehicles
- Department of Administration
- Department of Education
- Department of Employment and Training
- Department of Insurance
- Department of Mental Health
- Indiana State Police
- Utility Regulatory Commission.

GIS PROPOSAL

The DPOC has recognized the importance of coordinating between various levels of government when developing data layers to insure that the most complete data layers are made available. A joint Department of Administration/Data Processing Oversight Commission proposal was submitted to the legislature to initiate the coordination, liaison and planning required to effectively manage the development of GIS by state agencies. The GIS Advisory Resource Group assisted the Data Processing Oversight Commission in preparing the requirements and recommendations for the proposal that was submitted.

The proposal outlined the initiation of a coordination/study group to determine the steps required to initiate the State of Indiana Office of Geographic Information Systems. The coordination/study group would also:

- provide an interim solution for coordination for GIS on a short-term basis;
- provide coordination of GIS activities and act as liaison between state agencies, local levels of government and the federal government; and
- develop a comprehensive plan for the long-term solution of GIS capabilities within state government, identifying the best solution for the organizational home for the Office of GIS.

As of this writing, funding has not been identified to accomplish all of the recommendations submitted for the coordination/study group. Currently, the Data Processing Oversight Commission and the Department of Administration

are attempting to identify means of providing support of these recommendations with limited funding.

GIS COMMITTEES

Two committees are necessary to create direct input mechanisms to the state for local and federal entities on GIS related issues. The GIS and Mapping Policy Committee would serve to review and approve policies at a high level within state government for mapping and geographic/land information systems within Indiana. In addition, a GIS Advisory Resource Group would continue to strengthen and promote the partnership that must be created between state agencies, local counties and cities, universities, and the federal agencies. Additionally, this group would serve as a technical review committee for DPOC, the GIS and Mapping Policy Committee and the Office of GIS as required.

In order to complete the comprehensive plan for GIS, a number of specific issues must be addressed. Technical Advisory Task Forces have been outlined. These are made up of specialists and technicians from all levels of government and universities that want to participate. The objective of creating these Technical Advisory Task Forces would be to continue to enhance the cooperative efforts of the various government sectors and the universities and, hopefully, to determine cooperative avenues for accomplishing satisfactory results for all concerned, while reducing the cost and redundancy for each participant. The Office of GIS would be responsible for organizing and driving these committees.

THE STATE OFFICE OF GIS

Once established, the Office of GIS would be responsible for insuring a comprehensive approach is taken for the development of Indiana State GIS. This office would provide the ongoing coordination between the various levels of government and between state agencies, establish and maintain a state GIS data exchange clearinghouse and determine joint funding opportunities for GIS related issues. In addition, the office would provide GIS technical assistance and support to state agencies and local entities and provide an information resource to all entities involved with the technology (see figure 1). The Office of GIS would, in effect, be the focal point for GIS within State government, to complete the state GIS comprehensive plan and implementation plan.

For some time now we have been discussing various constructs for state-local information exchange. After some deliberation we decided that it would be extremely useful for the state Office of GIS to have a focal point of contact with the local entities. If a County GIS Liaison could be determined for each county, it would provide the County with something similar to the State's Office of GIS in terms of data and information exchange. The local group that takes on this responsibility may be different for each county (perhaps the County Auditor or the County Surveyor). We are researching an efficient way to funnel information to the counties and, through the County GIS Liaison, to the local entities within the county.

Grants in Aid programs have been recommended and successfully implemented in a number of other states. The State Office of GIS would anticipate establishing a similar program to encourage local entities to adopt the standards

and architecture developed by the state for the comprehensive GIS and to enhance the integration of the data once it is developed.

Figure 1: Pathways of Communication for State Office of GIS
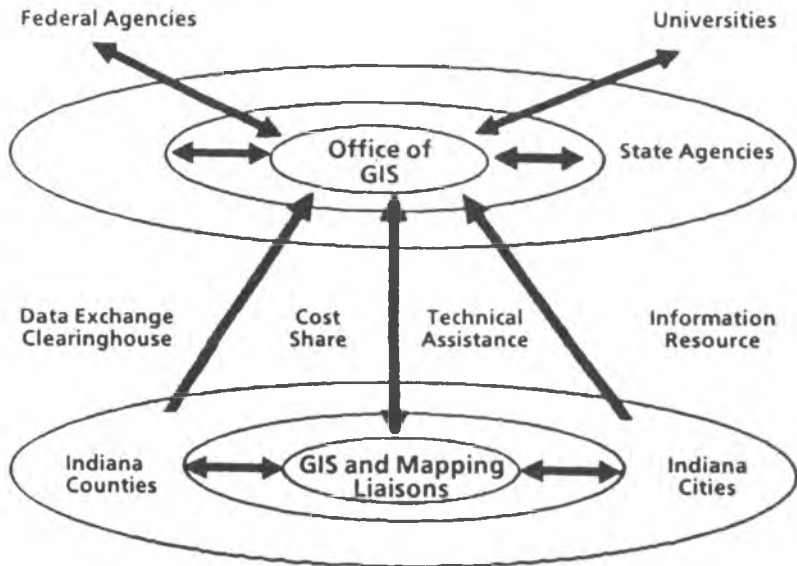
CONCLUSION

When considering the cost involved with the development of GIS capability, and the impact this technology has had on government entities, it is extremely important to impress upon policy and decision makers the importance of cooperatively developing GIS data layers. It is essential for these layers to address the needs of any number of users, for any number of uses. GIS technology is one of the most expensive technologies currently being marketed to government entities. When developed correctly, this technology has proven to be invaluable for addressing significant issues in a timely manner. It is in the government sector's own best interest to consider a wider spectrum of needs — to more effectively invest in the technology.

It is apparent that other states have duplicated efforts in automated data capture, data analysis and presentation. Many of these costly mistakes can be avoided. A cooperative partnership can be forged that would minimize this duplication of effort, funding, and human resources — all scarce commodities these days, with shrinking budgets and hiring freezes. We currently have an opportunity to get ahead of GIS technology in Indiana, rather than let it get ahead of us. It is our hope to take full advantage of this opportunity. Only with local government input and cooperation will this be possible.