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Executive Summary

Geographic Information Systems (GIS) technology uses computers to organize and analyze complex data through digital mapping. The GIS Work Group of the Intergovernmental Information Technology & Telecommunications (IITT) Task Force studied issues related to the implementation of GIS technology in all levels of the public sector as well as the private sector.

First used in Iowa's academic institutions in the mid-1970s, GIS has in the last eight years become an integral data management tool in private business and in state, city, county, and federal offices. Applications vary widely, and include such diverse applications as management of emergency and utility services, inventories of natural resources, and retail marketing studies.

Iowans would benefit enormously from the expanded use of GIS in both the public and private sectors. To achieve the goal of widespread, efficient use of GIS in the public sector, public institutions and organizations, along with units of local government, will need to share fiscal resources and technological expertise; will need to develop cooperative GIS training programs; and will need to develop guidelines regarding data format, access, and retention.

One function of GIS is to refine/distill voluminous data to manageable, meaningful proportions (examples from police departments, assessors offices, various departments in universities, and census data).

An important step toward achieving the widespread and efficient use of GIS in the public sector is improved coordination of resources among and within agencies at every governmental level. Some agencies would benefit from the establishment of a core staff that would oversee GIS implementation and expansion. Others will need to rely on formal and informal intergovernmental networks for technical support and coordination.

Standards for GIS information development, exchange, and interpretation already exist. State government should have a role in the oversight of GIS standards use in Iowa. The use of these standards will be important as more information is developed and used by growing numbers of entities. This growth in GIS user numbers will be fueled by rapidly improving and lower cost GIS hardware and software.

This growth in user numbers also creates an expanding number of potential cooperation and partnering opportunities between organizations (both in the public and private sectors). A wide range of social and economic impacts across these sectors is anticipated. While most of these impacts are positive, there are potential pitfalls that need to be mitigated for, including privacy, confidentiality, data ownership, and other issues.

The GIS Work Group report includes one project proposal which address the primary issues discussed in the report. This project includes providing for an authorized Iowa Geographic Information Council to oversee standards and facilitate inter-organizational cooperation. This project will also increase the capability of an existing Iowa Geospatial Information Clearinghouse, which will improve access to GIS data from a large number of sources. The final component for this project provides for a coordinated approach to education and training on GIS technology and applications at

all levels.

Work Group Overview

This report on Geographic Information Systems (GIS) opportunities for intergovernmental information technology efforts is one component of a larger planning process. The State of Iowa recognizes the value of its technology infrastructure and is seeking to position the state to capitalize on future opportunities to effectively serve citizens through information technology.

To accomplish this, the State of Iowa is developing a plan to prioritize goals for the state, identify action steps, and determine what is real and practical. Ultimately, the state plan will be used as a tool for the state to determine and properly direct resources.

The Intergovernmental Information Technology & Telecommunications (IITT) Task Force was appointed by the Iowa Department of Management to complete this planning process. The Task Force determined that work groups would be convened to accomplish the in-depth examination of five issue areas:

- General Government
- Electronic Commerce
- Human Services
- Geographic Information Systems (GIS)
- Criminal Justice & Public Safety

During the course of the summer and fall of 1996, each work group engaged in a consistent planning process set forth by the Task Force. The outcome of this planning consideration. From the Task Force's work and that of the work groups, the Task Force will develop a plan for Iowa's future intergovernmental information technology efforts that include specific recommendations for projects and outcomes.

This report represents the work of the Geographic Information Systems (GIS) Work Group. Meeting monthly from June through December 1996, the 20-member work group conducted a thorough examination of the issues relating to the expanded use of GIS in state and federal agencies, local government, educational system, and in the private sector.

Chaired by Marty Adkins of the United States Department of Agriculture, Natural Resources Conservation Service, the work group focused on responding to the following vision:

> *Create and promote an efficient GIS environment that fosters cooperative partnerships among public and private organizations to make government services more effective. These partnerships will include accessing and collecting data, sharing data, application development, and education.*

This report outlines the various means that GIS can be utilized by the public and private sectors and the need for cooperative partnerships in sharing data.

Environmental Assessment

Introduction

In the past eight years, Geographic Information Systems (GIS) users in Iowa have gone from being newcomers in the technology to participating in many, very advanced GIS applications. Although Iowa academic institutions have utilized GIS applications since the mid-1970s, most Iowa GIS users have entered the field only recently. GIS hardware and software, which five years ago was difficult to use and limited in its capabilities, has become more popular and widely used across Iowa as vendors have begun offering desktop software for desktop computers. Vendors continue to make GIS software easier and cheaper to buy.

Advances in software have also brought a change in how many organizations operate GIS programs in their offices. Until recently many organizations had one dedicated employee run the software and take care of the hardware. Today, many organizations use GIS as a day-to-day business tool similar to word processing and spreadsheets, and may not have a "GIS expert" in-house. All of these factors have contributed to making GIS a popular tool for problem solving and decision making.

While it is true that GIS software has proliferated into the day-to-day activities of many users, it is also true that GIS software has become more powerful and easy to use. However, in large agencies and organizations, particularly those charged with the collection and maintenance of very large volumes of data, deployment of GIS technology has lagged. This is due to a number of reasons, all of which motivate taking the approach of developing a core staff of GIS experts led by an organization GIS coordinator. Among these reasons are the lack of common referencing methods, sharing/non-duplication of data collection activities, and proper selection of compatible hardware and software, not to mention network issues. Standards need to be established without constraining the best fit of technology to applications. And, while it is possible and even likely that users will obtain, learn, and use a single GIS software package, few will ever develop skills on several platforms. A core staff and coordinator can develop these skills across platforms and be in the best position to recommend appropriate technology for the job. Further, many institutional barriers to implementation of GIS cannot be overcome by individual, seemingly unrelated GIS efforts which are likely to develop with little or no consideration to the overall impact on the enterprise or organization.

GIS technology is increasingly used in Iowa and nationwide by government, academic institutions, utilities, and private organizations. Although many of these organizations define GIS differently and use the technology for different purposes, a common definition is the use of maps and their associated data for decision making in an automated manner.

Current Uses and Projects

A recent survey conducted by the Iowa Geographic Information Council (IGIC) determined that there is widespread use of GIS technology in Iowa. There is also a variety of uses for this technology. While the survey only represents a small sampling of Iowa GIS users, it demonstrates this diversity of uses among user groups. The following information is NOT exhaustive and represents only a portion of current GIS uses.

Federal Government

GIS uses in federal agencies cover a wide range of applications including: environmental management mapping, forestry mapping, dredged material placement, navigation study, archeological sites, cultural resources mapping, farm systems management, plant species distribution maps, rainfall distribution, natural resource analysis, and large scale base mapping. Among the federal agencies currently utilizing GIS technology are: US Department of Agriculture, National Soil Tilth Lab; US Department of the Interior, Geological Survey; United States Department of Agriculture, Natural Resources Conservation Service; and the US Army Corps of Engineers.

State Government

The Iowa Department of Agriculture's Pesticide Bureau is developing a series of databases to assist in the development of pesticide-specific State Management Plans (SMPs). The Bureau is also developing a GIS approach to assist professionals investigating pesticides and groundwater to better explain the complexities to the policy makers who will be involved in developing the SMPs, the regulated community, and the public. With funding from the Environmental Protection Agency (EPA), the Bureau is establishing databases of pesticide use and detection in groundwater.

The Census Data Center uses GIS technology for a variety of uses including: redistricting, thematic mapping, census and education data analysis, and school district boundary maintenance.

Through the Natural Resources Geographic Information System (NRGIS) Library, the Iowa Department of Natural Resources (IDNR) develops, organizes, documents, and maintains spatial databases. IDNR also utilizes GIS to track information on forestry, fish and wildlife, environmental protection, parks, recreation, preserves, waste management, energy, and geology. In addition, IDNR works with other government agencies, private organizations, and the general public on GIS issues.

The Emergency Management Division of the Iowa Department of Public Defense utilizes GIS for many applications including: mapping support for emergency response and preparedness, radiological emergency (power plant) planning, and buy out mitigation mapping.

The Iowa Department of Transportation (IDOT) has begun implementing a GIS strategic plan, developed with the assistance of the ISU Center for Transportation Research and Education (CTRE). They have formed a GIS Coordinating Committee (GIS-CC), with representation by all IDOT divisions. The IDOT is in the process of developing two full-time GIS positions: one for GIS coordinator and one for database administrator. The department has also identified several GIS pilot projects, being developed by CTRE under the direction of the GIS-CC. These include access to roadway sufficiency information, a GIS-based accident location and analysis system, an inventory of utility locations, identification of roadside features and their relation to accidents, highway access, and data useful in supporting project-level (location) decisions. Other pilot projects include identifying and disseminating detour locations, inventory and assessment of environmental mitigation areas routing analysis, and improved inventory of IDOT-owned parcels of land. Several other IDOT projects are utilizing or investigating use of GIS technology. These include pavement management, improved cartography (mapping), GPS and orthophotography applications. The IDOT is a founding member, sponsor, and active participant in the Iowa Geographic Information Council (IGIC).

Other state agencies and organizations including the Iowa Department of Economic Development,

Iowa Department of Public Health, Iowa Department of Commerce, Iowa Department of Education, Legislative Service Bureau, State Library, and the State Historical Society are also using GIS.

County Government

County governments are increasingly becoming aware of GIS and the many applications it can have for their counties. Most counties are only beginning to establish their programs and many find that funding for hardware, software, and training are barriers to implementation.

The Black Hawk County Engineer's Office has implemented a module for transportation planning, design, construction, and maintenance. This allows the county to execute a wide range of applications such as: a sign inventory for improved road safety, a flood control inventory for operational and maintenance improvements on drainage structures, and pavement management. The county has also produced GIS base maps of the county.

In 1988 Story County and the City of Ames initiated a joint effort in which hard-copy orthophotography (aerial photos that have distortion caused by tilt and curvature of the earth corrected) with mylar cadastral map (map which shows recorded property boundaries, subdivision lines, building, and related attributes and details such as quantity, value, and ownership of real estate using mylar, a material that is more resistant to shrinkage and distortion than paper maps) overlays were acquired. In 1991 this effort was expanded to a GIS phase with the digitization of the mylar cadastral overlays by an outside mapping contractor. Recently, the project developed a street centerline file for the E911 addressing system and has imported an existing real estate database into the system which includes ownership, address, assessed value, zoning, tax credits, drainage district, average Corn Suitability Rating, and other information. Currently three GIS stations are networked within the Story County Courthouse in the Auditor, Assessor, and Planning and Zoning offices. Two stations are located in the Ames City Hall offices of the Assessor and Planning and Zoning Departments. The city-county GIS Committee recently completed a strategic plan for GIS development which takes a client-based approach to providing GIS services and is based on a vision for the use of geographic information in the year 2000.

The Johnson County Board of Supervisors has appointed an Ad Hoc Committee on GIS to assess the current status of GIS development in county government and to develop a plan for GIS implementation in the future. The committee plans to report to the Johnson County Board of Supervisors in September 1996.

In addition to these ongoing projects, several counties, such as Des Moines, Dickinson, Humboldt, Washington, Webster, and Wright are in the planning stages of implementing a GIS program. County governments have noted a variety of GIS applications they utilize including: tax mapping, emergency management, and access to road and bridge information.

Central Iowa Automated Mapping Project

Through the Central Iowa Automated Mapping (CIAM) Project, the City of Des Moines and portions of Polk County have a GIS which allows for accurate and streamlined information management. The project was achieved through a cooperative effort of the city and county to attain a more efficient method of managing various types of geographic information and related data. This system is shared with 17 local communities in the central Iowa area.

City Government

Several offices within many of Iowa's city governments are currently making use of GIS including: assessors, engineers, planning departments, water departments, and police departments. While some cities such as Ames, Ankeny, Des Moines, Cedar Rapids, and West Des Moines have already begun using GIS, others such as Iowa City are in the planning process. Still other cities such as Coralville and Dubuque have completed the planning stages and are in the process of transferring information to the system and developing applications. As with other levels of government, GIS applications are varied among cities and include: assessment mapping, mapping for easements, storm and sanitary sewer mapping, utility system modeling, making public property records readily available to the public, and emergency services.

Intergovernmental Groups

Several intergovernmental groups such as regional councils of governments, resource conservation and development organizations, and metropolitan planning organizations are currently utilizing GIS. Many intergovernmental groups use GIS to implement transportation planning guidelines as outlined in the Intermodal Surface Transportation Efficiency Act (ISTEA). Other applications utilized by this group include: census data, natural resources data, corn suitability ratings, socioeconomic analysis, and facilities management.

Iowa Geographic Information Council

The Iowa Geographic Information Council (IGIC), formed in 1994, is a partnership of Iowans who use, or plan to use GIS. Included in this partnership are federal, state, and local government agencies, academic institutions, businesses, and nonprofit organizations. The IGIC serves as a forum for sharing data, exploring standards, and facilitating cooperation among Iowans who use GIS. Through its efforts, the IGIC has started to build a network of people and information needed to support coordinated GIS and Global Positioning Systems development in Iowa.

Coordinated GIS, IGIC's quarterly newsletter, is mailed to hundreds of GIS users and other interested individuals and organizations. This newsletter publishes articles on GIS applications, training opportunities, and other related information.

The IGIC also held its first conference last fall in Iowa City and was attended by more than 350 people. Conferences are open to all individuals interested in GIS.

Iowa Geospatial Data Clearinghouse

The Iowa Geospatial Data Clearinghouse (IGDC) is a branch of the National Geospatial Data Clearinghouse. The IGDC offers a cooperative, distributed database of geospatial information available to the public, private, and government sectors. The IGDC provides users with a means for identifying sources of spatial data information about Iowa, including GIS data, aerial photography, paper maps, cartographic or GIS services in Iowa, or software vendors with offices or sales areas including Iowa. Persons accessing the IGDC can quickly find information and services from government, academic, commercial, or library sources.

Utilities

As with other users, utilities have realized the benefit GIS applications can have in increasing their effectiveness and efficiency.

Cedar Falls Utilities, a company which oversees four utilities, has used GIS for many years. GIS has, and will, enable the organization to achieve increasingly accurate positions for planning purposes, maintenance, and emergency situations. In additional, Cedar Falls Utilities plans to use Global Positioning Systems in conjunction with GIS to track service dispatch vehicles which will increase its efficiency in dispatching for routine and emergency situations.

In 1988 MidAmerican Energy began using GIS to digitize aerial photos primarily for network analysis of its facilities and plans to complete this process for all its Iowa territory around the year 2000. At a meeting held in mid-1996, MidAmerican Energy and the Iowa Department of Transportation agreed that better communication is mandatory for efficient operations in each organization. A likely means of achieving this goal is the use of a GIS map and database.

Academic Institutions

Community Colleges

There are several community colleges that are currently offering courses in GIS and GPS.
Hawkeye Community College offers precision farming and computer/telecommunications options in their Agriculture and Food Technology program. Hawkeye has offered a variety of seminars and demonstrations of GPS/GIS technology. GIS will be integrated into Police Science, Civil Engineering Technology, Truck Driving, and Aviation programs.

Iowa Lakes Community College has applied for a National Science Foundation grant to improve GIS laboratory facilities, and plans to launch a GIS technician program in the fall of 1997. Iowa Lakes has offered a GPS workshop in the fall of 1996 and plans to integrate GIS technology into the Environmental Studies, Law Enforcement, and Legal Assistance programs.

North Iowa Community College have offered a variety of GPS/GIS workshops dealing with applications in agriculture. They will be integrating precision farming with their current curriculum structure.

Iowa State University

The Geographic Information System Research and Support Facility at Iowa State University supports researchers whose projects can be strengthened through the use of GIS technology. Researchers interested in learning how to use GIS technology can participate in regularly scheduled short courses, and those who already know how to use the technology can benefit from additional assistance and support from Facility staff.

Among the departments at Iowa State that utilize GIS are the Agronomy Department for research and the Animal Ecology Department for land use, natural resource, habitat, and landscape analysis.

The Department of Community and Regional Planning offers courses in GIS as well as conducts research using GIS as an analytical tool. Through academic and extension activities the department is addressing environmental, social, infrastructure, and land use issues. Most recently, the department has applied GIS technology for city and county comprehensive planning projects within Iowa.

The Transportation Planning and Information Systems unit at the Center for Transportation Research and Education (CTRE) at Iowa State University has one of the largest and most active GIS programs among academic institutions in Iowa. Among other projects, CTRE is using GIS technology to support metropolitan transportation planning, early deployment of intelligent transportation systems (ITS), and statewide management of thousands of miles of Iowa's highway pavements. CTRE has an extensive and ongoing relationship with the Iowa Department of Transportation and is assisting the department with GIS pilot projects and implementation of its GIS strategic plan. CTRE has the largest GIS laboratory in Iowa and has experience with many GIS platforms and software packages. Finally, CTRE provides the administrative support for the IGIC, publishes the IGIC newsletter, and coordinated the 1996 Iowa statewide GIS conference.

University of Iowa

Several departments at the University of Iowa are using GIS, many of which also work collaboratively with federal and state agencies and other University departments.

The Geology Department currently uses GIS for a variety of projects including: integrating watershed modeling at high resolutions in near-real time; examining fossil records for evidence of climatic changes; and exploring groundwater chemistry and methane generation at landfills. Several doctoral students are also using applied GIS in geomorphology (landform dynamics), hydrology, and integrated physical processes (integrating several layers of data). The department is also developing a proposal for an interagency initiative to provide comprehensive flood management and modeling for the Coralville reservoir. Collaborating agencies for these efforts include: Corps of Engineers, Iowa Department of Natural Resources, US Department of Agriculture, Natural Resource Conservation Service, NASA, US Geological Service, National Oceanographic and Atmospheric Administration, and the National Science Foundation.

In consultation with other departments, the Geography Department is building an extensive GIS facility. In addition it provides training to geography students, and has the potential to provide training to students of other disciplines as time and facilities permit. The department is also assisting the Iowa Cancer Registry by inputting information into a GIS database on Scott County mammography and breast cancer. The Geology Department has received a grant from the Department of Education to provide GIS training for public health personnel and other targeted groups.

Other departments which utilize GIS include: Social Work, Urban and Regional Planning, Preventive Medicine, and Anthropology. Several university centers also employ GIS including: the Center for Health Effects of Environmental Contamination, the Center for Global and Regional Environmental Research, and the Public Policy Center.

University of Northern Iowa

The University of Northern Iowa (UNI) significantly improved educational and research opportunities for undergraduate students, graduate students, and faculty in 1996, with the completion of the College of Social and Behavioral Sciences Geographic Information Technology and Computer-Assisted Drafting and Design (GIT/CADD) Laboratory. This facility contains 15 Pentium Pro Workstations with digitizers, and networked plotters and printers, and Internet access. Software used for instruction and research include: Idrisi for Windows, AutoCadd 13, Arc View 3.0 with Spatial Analyst, PC Arc/Info, Geographic Calculator, and Atlas GIS.

The Department of Geography currently offers the following courses in Geographic Information Technology (GIS, GPS, CADD, and Remote Sensing) for undergraduate or graduate credit: *Aerial Photo Interpretation and Photogrammetry, *Geographic Information Systems I, *Thematic Cartography, *Remote Sensing of the Environment, *Geographic Information Systems II, and Field Studies in Geography (GPS Field Survey Methods and Techniques). Students successfully completing the above (*) courses with a GPA of 3.0 in the 15 credit hours receive a Program Certificate in Cartography and Geographic Information Systems. Beginning in January 1997, students may also receive certification in ArcView 3.0 and Spatial Analyst.

GIT research opportunities at UNI include both basic and applied research. Research interests of students and faculty are currently focused on the following areas: environmental, natural resource management, health, economic and business, and transportation applications of these powerful spatial analysis methodologies. UNI faculty members are also participating in the Black Hawk County GIS Project.

Drake University
The Drake Geography and Geology Department offers two GIS courses and supports the Drake Geographic Information Technologies Lab which gives students first-hand experience in working with GIS projects. The lab is funded through the department and grants in GIS, GPS, and remote sensing production and research.

Private Colleges
Private colleges such as Cornell and Briar Cliff are also utilizing GIS for a variety of applications including research and training.

Geographic Alliance of Iowa
During the summer of 1996, the Geographic Alliance of Iowa (GAI) brought together K-12 teachers, college and university professors, other education personnel, and citizens to address their shared concerns of improving geographic instruction in Iowa. As part of GAI's goals, it assists in development of quality teaching materials and acquisition of appropriate technologies and equipment including the use of GIS.

Private Sector

Private Sector Users
Many Iowa companies, both large and small, are realizing the benefits GIS applications can have on their businesses. From precision farming to transportation/logistics, real estate, utilities, publishers, marketing, research, insurance, warehouse/distribution, and communications, GIS technology is

making an impact on business practices. Types of private sector companies utilizing GIS include a farm machinery manufacturer, a telephone utility, a regional gas and electric company, farmers, fertilizer and chemical suppliers, a seed research and production company, a professional farm management and farm real estate company, a newspaper publisher, a magazine subscription verifier, a direct mail marketing company, a life insurance company, a property and casualty insurance company, an insurance adjuster, a regional and national trucking company, a national distributor, and an agricultural research company.

GIS Services Providers

Several companies in Iowa and surrounding states provide mapping services as well as GIS development and implementation services to Iowa cities and counties. Several companies have developed specialty data collection equipment and GIS software utilities for use by farmers and the agricultural community. One marketing service company provides GIS services and data services to major corporations in Iowa and nationwide.

A comprehensive list of GIS resources is currently being developed by the Iowa Geographic Information Council.

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Vision and Goals

Vision Statement

Create and promote an efficient GIS environment that fosters cooperative partnerships among public and private organizations to make government services more effective. These partnerships will include accessing and collecting data, sharing data, application development, and education.

Goals

·Provide access to low-cost, documented GIS data (base, current, and historical) while ensuring privacy of individuals and businesses.

·Provide low-cost, accessible GIS training and education for decision makers and users.

·Provide low-cost access to current GIS technology (hardware and software).

·Encourage formal coordination of GIS/GPS efforts to eliminate unnecessary redundancy.

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Barriers/Resolution of Barriers to Goals

To implement a move toward the coordinated utilization of GIS/GPS technologies throughout the state of Iowa, a variety of barriers must be addressed. These barriers may be physical, financial, and/or psychological. The following section explores these barriers on an individuals basis and recommends solutions for overcoming them.

Often, proposed solutions engender barriers of their own, thus we have also proposed means by which to address these additional "solution barriers." In the following section, barriers are organized by work group goals, which are stated in bold type. Beneath each goal are the barriers to that goal, listed in italics, followed by a numbered list of solutions. In cases where solution barriers have been identified, they have been indented and italicized beneath the solution with which they are associated.

Provide access to low-cost, documented GIS data (base, current and historical) while ensuring privacy of individuals and businesses

Barrier: *Conversion of existing data is labor-intensive*

Resolution to Barrier

1. Where appropriate, hire "dedicated" personnel (as opposed to incorporating data collection duties into existing positions). Expense of creating new positions may hinder this.

2. Improve relationships among academic facilities to update data by using interns, coop programs, etc.

3. Where possible, agencies and organizations should share existing data.

4. Reduce need for discreet efforts by creating base maps at the most widely useful level of accuracy.

Barrier: *Many agencies and organizations do not define the accuracy and extent of data collection required*

Resolution to Barrier

1. Data needs by each agency/organization should be prioritized.

2. Potential users should be identified as well as their required level of data accuracy.

Barrier: *Data storage standards are inconsistently adhered to*

Resolution to Barrier

1. Utilize existing and developing federal standards.

2. Develop written policies for documenting data.

Barrier: *Data needs to be continually and consistently updated*

Resolution to Barrier

1. Develop schedule for agencies/organizations for updating.

2. Archive "old" data for historical preservation. Guidelines for determining when data becomes "outdated" needs to be defined.

3. Management should develop policies for scheduling and staffing for data maintenance.

Barrier: *Lack of planning for data storage and maintenance*

Resolution to Barrier

1. Determinations should be made on how much storage capability is needed for commonly utilized data as well as the medium in which they should be kept.

2. Determinations on where "old" data is stored and how it is accessed should be made. This should include format, medium, and who provides technical support for this process.

Barrier: *Many agencies/organizations need technical assistance within their own offices to access data*

Resolution to Barrier

1. Each agency/organization should identify an individual within the office who has technical knowledge regarding file transfer and electronic access.

   Barrier: *Many offices may be too limited in staff and budget to train even one person.*

Resolution to Barrier

1. All agencies/organizations could have access to someone with technical knowledge on a shared basis.

Barrier: *No formal policies exist to ensure confidentiality protection and privacy*

Resolution to Barrier

1. Formal policies should be formulated and enforced and should include levels of access to data.

Barrier: *The law regarding GIS lags behind the development of the technology. Few experts exist in this area, with little or no case law or legal opinions available. Unresolved issues include:*

- ·Data ownership/copyright
- ·Public access/ FOIA
- ·Protection of privacy/confidentiality
- ·Liability in cases where use of GIS data has led to "bad" decisions
- ·Charging for public GIS data - how much and to whom

Resolution to Barrier

1. Explore existing access options in other states and at the federal level.

2. Clarify and formalize Iowa's policy on access to and liability arising from the utilization of GIS data sets.

   Barrier: *There are many approaches to GIS access and liability, thus dissention can be expected to occur.*

   1. Involve key players in policy formulation

   2. Prioritize importance of competing needs (i.e. need for improved access vs. need for increased staff to handle requests for information; need for cost-recovery vs. need to equalize access).

Provide low-cost, accessible GIS training and education for decision makers and users

Barrier: *Lack of adequately trained personnel*

Resolution to Barrier

1. Identify existing personnel pool.

2. Increase available personnel through recruitment and training.

Barrier: *GIS decision makers and users are unsure if they should use a centralized or decentralized system*

Resolution to Barrier

1. Provide decision makers with an analysis of the benefits/pitfalls of each system.

2. Share information from experienced GIS users (both centralized and decentralized) with decision makers to help them make better decisions.

Barrier: *There is a lack of knowledge in agencies and organizations on GIS applications*

Resolution to Barrier

1. Compile "showcase" GIS projects to distribute to decision makers and potential users.

2. Develop a guide of GIS activities by agencies and organizations.

3. Provide outreach to groups who want to use GIS or who have potential use of GIS.

Barrier: *There is a need for trained personnel who can develop new GIS applications*

Resolution to Barrier

1. Build a group of trained personnel to develop new applications.

   Barrier: *Need to identify knowledgeable person(s) to conduct training.*

2. Improve interaction between those who have successfully applied GIS/GPS and those who wish to do so.

Barrier: *There is a lack of understanding of the importance and usefulness of GIS technology by policy makers and the general public*

Resolution to Barrier

1. Provide presentations on the benefits of GIS to policy makers at all levels.
2. Create a liaison system between technical experts and policy makers.
3. Develop a directory of policy makers and technical support staff for consultation.
4. Develop an outreach plan to the general public to increase awareness of GIS.

Provide low-cost access to current GIS technology

Barrier: Expense of GIS hardware and software

Resolution to Barrier

1. Where possible, utilize existing equipment.
2. Develop plans and priorities within organizations for acquiring equipment.
3. Acquire hardware and software slowly and build up to total plan.
4. Ensure equipment purchased is adequate for GIS applications.
5. Increase "transferability" between systems.
6. Build complete GPS base station network.
7. Explore volume discounts for multi-site licensing of software.

Barrier: Lack of knowledge about equipment options by agencies/organizations

Resolution to Barrier

1. Target information to decision makers on equipment options.
2. Create a liaison between decision makers and "techies."
3. Provide information regarding differences between systems.

Barrier: Lack of adequate funding for GIS

Resolution to Barrier

1. Increase knowledge of funding sources.
2. Share current funding sources.
3. Use creative and interdependent proposals to tap into earmarked funding

sources.

4. Increase cooperative development of databases and share expenses of data collection.

5. Develop new public/private cooperative efforts.

6. Encourage an increased funding commitment to GIS/GPS among administrative, elected, and appointed officials.

Barrier: *There is an increasing need for larger bandwidth and connectivity to speed intergovernmental transmission of data*

Resolution to Barrier

1. The ICN provides large bandwidth which can be accessed by ICN authorized users.

2. Encourage investment by private access providers.

Barrier: *Some organizations are not currently hooked up to the Internet due to cost and because of a resistance to change*

Resolution to Barrier

1. Agencies/organizations should implement policies which would make hooking up to the Internet a priority.

2. Change state legislation which prohibits some organizations and governmental bodies from using the ICN.

3. Negotiate cost reductions with Internet providers for "group" hookups.

4. Demonstrate ease and efficiency of being hooked up to the Internet for decision makers and users who are resistant to change.

Encourage formal coordination of GIS/GPS efforts to eliminate unnecessary redundancy

Barrier: *There is an incompatibility between many systems used by agencies/organizations that share data*

Resolution to Barrier

1. Seek improved transferability of data between systems.

2. Conduct an analysis of agencies/organizations who need to share data and promote compatibility of their systems.

Barrier: *Some agencies/organizations are unwilling to share existing data*

Resolution to Barrier

1. Develop formal policies regarding who should have access to which data and at what level of access.

2. Identify individuals from each agency/organization to work on improving interagency cooperation and coordination on GIS efforts.

Barrier: *There is a lack of coordination among agencies and organizations in identifying useful GIS data*

Resolution to Barrier

1. Encourage cooperation and coordination among agencies and organizations in identifying potentially useful data that may be available.

2. Reduce institutionalized interagency barriers such as paperwork and unnecessary "red tape."

Barrier: *There is no formalized, specific entity which addresses GIS issues and facilitates cooperation in using GIS*

Resolution to Barrier

1. Formalize the Iowa Geographic Information Council (IGIC), a forum for sharing data, exploring standards, and facilitating cooperation among Iowans who use GIS.

2. Encourage all agencies and organizations to participate in IGIC activities.

Barrier: *GIS expert staff turnover in agencies leaves holes in GIS-savvy staff which contributes to the dissipation of GIS/GPS projects*

Resolution to Barrier

1. Develop an institutional memory through documenting GIS work in each agency/organization.

2. Build a group of technical support staff within each agency.

3. Fill vacant GIS positions relatively quickly through on-line position advertising (Internet) and an increase in targeted advertising.

Barrier: *Lack of assigned individual at each agency/organization responsible for GIS data*

Resolution to Barrier

1. Identify an individual in each agency/organization to update data and documentation.

Barrier: *Lack of formal, on-going GIS planning for all agencies exists*

Resolution to Barrier

1. Form an intra-agency committee to formalize a GIS implementation plan. Planning should be ongoing and should consider likely effects of long-term implementation. Planning should also be flexible enough to meet short-term exigencies. The plan should also include the following components: acquisition, training, and retention of GIS expertise.

Barrier: *Organizations and agencies do not utilize other organizations' and agencies' data as often as they could*

Resolution to Barrier

1. Promote collaboration among different agencies

Impact on Iowans

Geographic Information Systems (GIS) applications hold great potential for many Iowa citizens, businesses, and government agencies. From education to public safety, GIS has the ability to benefit Iowans' daily lives. The value of GIS applications to citizens are virtually limitless as can be seen by examples from Iowa and examples from other states which can be applied to Iowa.

Education

Through GIS applications, Iowa students at all levels can increase their understanding of subjects such as earth science and environmental science, as well as increasing other skills which can be applied to other subjects. GIS is a powerful teaching tool which, in conjunction with more traditional teaching methods, enables schools to graduate students who are better prepared to enter the job market more competitively. The use of GIS technology can also be used for administration, recruitment of students, marketing, and as a strategic planning tool. GIS is becoming a major factor in the global economy and Iowa education entities must ensure that students are prepared for this.

Secondary Schools

Across the country, GIS technology is increasingly being utilized in high school classes. Educators have found that integrating GIS with existing science curricula greatly strengthens the students' ability to understand geography, the environment, and sustainable development. While useful in developing problem-solving, reasoning, and investigative skills, interactive GIS programs in high schools also encourage students to draw on skills needed to develop higher-level thinking, including spatial and table queries, statistics, logic, and compound expressions.[1]

A recent two-year needs assessment study showed that implementing a GIS curriculum in the Palm Beach County School District (Florida) earth science classes produced students who performed significantly better than students who did not use a GIS curriculum.[2] This curriculum prepares students for post-secondary education in GIS-related fields as well as for entrance in the work force. With the success of this program, the Florida Department of Education plans to expand the use of GIS-based curricula to interested Florida high schools and middle-schools.

Although GIS has proved beneficial, training teachers to use the technology and equipping schools with the necessary hardware and software are often obstacles to implementation.

Post-Secondary Institutions

Many colleges and universities across Iowa have been using GIS for a number of years for a variety of applications. Many departments within these institutions have realized that graduating students who have GIS skills are better prepared to enter the job market competitively. GIS also provides students and faculty with an excellent research tool and well as offers a new forum to gain knowledge and understand relationships among data.

Community Colleges

GIS courses at the community college level carry many benefits for Iowans. Professional training for employees, retraining for career changes, and technical training for graduates of four-year degree programs are among the areas in which GIS can play a role.[3]

Public Safety/Emergency Management
The area in which all Iowans can benefit from GIS is through public safety and emergency management applications. Many cities and counties across the country have implemented a GIS to improve their E911 systems with better maps which allows emergency vehicles to respond more quickly to calls. In addition, GIS has been used successfully in emergency management.

Iowa Department of Emergency Management
GIS has been beneficial for planning and exercising for incidents involving the four Nuclear Power Plants affecting Iowans. GIS has allowed the Iowa Department of Emergency Management to visually display evacuation and shelter areas, traffic access and control points, and the path of any simulated radioactive releases from the facilities. The "real time" display of deployment of personnel and resources permits the decision makers to readily observe the implementation progress of established plans and procedures. The decision makers can see which critical facilities and populations are affected by simulated radioactive releases. The displays allow immediate determinations of which emergency protective measures are either in progress or no longer necessary.

GIS has also been helpful in tracking properties purchased through the Hazard Mitigation Grant Program as the result of the 1993 flood. Iowa Emergency Management has received support from the Iowa Department of Natural Resources and the U.S. Army Corps of Engineers in developing the various layers.

City of Houston
In April 1996 one of the most advanced transportation and emergency management systems was instituted by the City of Houston in cooperation with the Metropolitan Transit Authority of Harris County (METRO) and the Texas Department of Transportation. In addition to increasing its efficiency in disaster planning and response to hurricanes and floods, the implementation of a GIS has also assisted Houston with automatic traffic surveillance and control technology. This system is based on real-time traffic conditions and can be used by personnel to quickly dispatch emergency response vehicles as well as more readily anticipate traffic delays, analyze possible trouble areas, and divert traffic more smoothly.[4]

Plotting Traffic Accidents
The Pennsylvania Department of Transportation utilizes a GIS to plot traffic accidents to ensure safer transportation for its citizens. This system enables the department to make adjustments to traffic lights and to determine placement of traffic signals and signs.

Law Enforcement
Since 1987, the Sioux City Police Department has used GIS in a number of ways which assists the department in effectively using its resources. By dividing the city into "grids" or "areas" of 1,000 people/area, the department can more easily assess where its officers are needed. This area analysis is used for staff location/distribution; local policing effort in which officers are dispatched to the 18 highest areas of need to serve as problem solvers; crime analysis; and officer dispatching. The department currently uses MapInfo and is also looking into using GPS.

Assisting Probation Officers
In cooperation with the Geography Department at Kent State University, the City of Kent implemented a GIS designed to assist probation officers in record keeping, planning, and analysis. With this system, probation officers can more easily monitor their clients and fulfill their court requirements. In addition, the system allows officers to plan their visitation routes as well as alert law enforcement officers of their clients' location relative to risk areas such as schools and high-crime areas. This system has proven valuable to county courts and probation and police officials in educating the community on crime prevention.[5]

Drug Enforcement
Recently, California instituted the Statewide Integrated Narcotics System (SINS) which uses GIS to map crime trends and patterns and also to cross-reference case information to more efficiently allocate resources and plan for raids. Through SINS Southern California is able to monitor and coordinate drug-related enforcement activities.[6]

Governmental Services
By using GIS to provide and enhance services, many governmental bodies across the country have improved their efficiency in serving their citizens as well as saving taxpayers money.

Smart Bus in Iowa
With the assistance of GPS, the Des Moines MTA is undertaking the Smart Bus program to improve transfers between fixed route and paratransit vehicles. Through the Automatic Vehicle Locators (AVL) system all available vehicles equipped with the system can be located and displayed on a map. Through an on-board warning light system, drivers are alerted if they are early or late to a key stop and can then adjust their timing to arrive at the appointed time. Des Moines has served as a primary test site for the Smart Bus program with the expectation that it will be used in other parts of the state.

Transportation Planning
Many cities and counties have realized the benefit GIS applications can have in transportation planning. The Des Moines Area Metropolitan Planning Organization (MPO) set up a system it uses for many transportation purposes including mapping of existing facilities, such as roadways, airports, bus routes, truck routes, recreational and bike trails, and skywalk systems; defining Americans With Disabilities (ADA) service area applications for bus routes; geocoding Census data, building permit data, traffic count data, school enrollment data; projects funded in the metropolitan area; travel time data; physical, cultural, historic, and environmental features; and comprehensive plan data such as generalized land use plan data and major street and highway plan data. The MPO also uses GIS to interface with its travel demand forecasting model for the metropolitan area's transportation system, to better illustrate specifics about the output from that modeling process as it relates, for example, to turning movements, congestion, capacities, speeds, traffic volumes, and number of lanes.

Managing City Services
The City of Fort Wayne, Indiana has been very successful at integrating GIS into its government services. Fort Wayne extensively uses GIS applications to enhance the services of many of its

departments, including public utilities, community economic development, public safety, engineering, and storm water.[7] Most notably, Fort Wayne has used its system to more efficiently spend taxpayer dollars in repairing and replacing the city's water mains. Through its use of GIS, Fort Wayne has also benefitted from increased coordination among all governmental agencies.

Noise Management
The Los Angeles Airport Bureau has developed and implemented a noise management system using GIS technology. Using the Aircraft and Noise Monitoring and Management System (ANMMS), city policy makers are able to make more informed decisions when planning aircraft routings as well as better manage the overall airport system with accurate and up-to-date information.[8]

Lead Pipe Replacement
Utilizing GIS technology has assisted the City of St. Paul, Minnesota in prioritizing lead pipe replacement. By studying the relation between the presence of lead service pipes and the number of children under five years old, policy makers can reduce lead exposure to children by deciding which pipes to replace first.[9]

Human Services
GIS technology has also been used to track human services information for government agencies. The Iowa Department of Public Health has used GIS to track infant mortality rates in Des Moines while Philadelphia, Pennsylvania has used its system to compare the spatial relationship of various factors to the homeless population. The Linn County Geo Mapping project in Iowa plots child abuse and domestic violence cases; this information is used by both the police and human service agencies in the county.

Natural Resources
GIS technology has proved beneficial in Iowa and in other states in promoting land stewardship and encouraging effective conservation practices throughout the country. Through more accurate mapping of natural resources information, policy makers are able to make more informed management decisions.

1993 Flood Recovery
The Natural Resources Conservation Service used GIS during the 1993 flood recovery to make funding decisions on requests for financial assistance from local governments on repairs involving stream channel stabilization. These requests generally affected county bridges or roads that were impacted by stream bank erosion or sloughing. At some of these sites, unstable channel conditions made bank stabilization work by itself ineffective. At these sites channel stabilization, which added to project costs, needed to be incorporated into the repair project. Decisions had to be made at each of dozens of sites as to the appropriateness of stream channel stabilization work as part of stream bank stabilization.

Information gathered during aerial reconnaissance on stream evolution stages (completed in 1993 and 1994 as part of an unrelated project) was summarized in a GIS. Maps produced from the GIS were used in combination with damage inspection information and video documentation of the aerial reconnaissance mentioned above. This information helped target the higher cost channel

stabilization assistance to those sites that truly needed it. The result of this more complete investigation of each site was an approximate $3 million in savings when compared to the dollars initially requested.

Roadside Vegetation Management
The Golden Hills RC & D in Council Bluffs is working with Pottawattamie County to collect information which will enable the county to better manage its roadside vegetation. After the county collects the data, Golden Hills transfers it into a digital format. Currently, data for the southern half of the county has been digitized.

Watershed Analysis
In response to a directive from President Bill Clinton to address the environmental and economic impacts of the timber industry, the Oregon Forest Service is using GIS to provide information to more easily and accurately conduct watershed analysis. This has enabled the state to protect and restore the Oregon ecosystem while also minimizing the negative economic impact on timber-dependent communities.[10]

Integration of Natural and Social Science Information
GIS Technology and its related disciplines of Remote Sensing, Global Positioning Systems (GPS), Environmental Engineering, and other sciences are now providing the tools for improved decision-making. Scientists have substantial confidence in their models of the El Nino Southern Oscillation, and they are homing in on more accurate models of the ozone hole, the carbon cycle, and global warming. Scientists have found that human interaction does affect many of the natural phenomena with which we coexist. Understanding how collective actions affect this vital need to sustain food production and other basic necessities of life is imperative.

As stated, the natural science models of the environment are improving, and the data quality is also improving. However, it is necessary to integrate the lessons of natural science and social science. If, for example, our environmental models (based on natural science) indicate a need to change our lifestyle to avert destruction of the food production system, will we be able to educate people why and how we should change our collective behavior (based on social science)?

It is critical that the truth of scientific method, whether it be natural science or social science, serves as a basis for our decisions. Citizens, when equipped with the intelligence that GIS technology can provide, will be in a much better position to make wise decisions.

Utilities
The West Ohio Gas Company in Lima, Ohio recently implemented a GIS which benefits the company and its customers.[11] The system allows employees to more easily manage property records and has also been integrated with customer information services to assist personnel in providing quick answers to customer service questions. In addition to enhanced customer service, the company's system also enables employees to manage spatial information about its facilities; its relationship to customers, products, and services; and the land on which it operates.

Agriculture
The application of GIS and GPS to the agriculture industry can have great impacts on Iowans. With readily accessible data, farmers have already begun using "precision farming" techniques. Precision farming involves the creation of a base and historical database of crop and soil information at a subfield level for decision making. Specific software can create a "prescription" to control variable rate applications of seed, chemicals, and fertilizers for specific areas of a field. GIS map layers, including digital soil maps, fertility level maps, weed maps, physical characteristic maps, and detailed yield maps, allow farmers and landowners to document farming practices and regulatory compliance. These techniques allow improved performance and help optimize productivity. It is predicted that farmers, with assistance from agribusiness, will use this technology to lower costs and improve the sustainability of their farm business.

Private Sector
Many companies are becoming aware of the benefits GIS has on its internal business as well as its customer services. Iowa's strategic location at the crossroads of North America, with transportation/logistics and developing warehouse/distribution and communication businesses are all adopting GIS technology. Businesses such as insurance, publishing, and marketing (which are also prevalent in Iowa) are also adopting GIS technology.

Trucking/Freight
The Holiday Express trucking company in Estherville, Iowa uses a Qual-Comm satellite communication system in each of its vehicles. While being able to locate vehicles within 1/4 mile, the system also allows drivers to send phone messages to the office via satellite. The system also provides the status of the vehicle (e.g. running, idle, off) and digitally stores truck positions in fourteen-day storage. This system allows the drivers to keep in contact with the office without stopping to find a telephone.

Engineering
Finley Engineering, a consulting firm specializing in communications and utilities mapping, uses differential GPS to position its survey vehicles. This technology allows the company to locate and size utility poles, pedestals, etc. from the survey vehicle. The collected data is then transferred to maps for municipalities, utility, and communications companies.

Real Estate
Commercial and residential real estate firms are also utilizing GIS technology. Commercial firms are helping clients identify expansion sites which are suited demographically to their needs. Residential firms are identifying areas which demographically are underserved and are in need of development.

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Impact on Personnel

As with the introduction of any new technology or idea into a workplace, the implementation of a Geographic Information System (GIS) in government offices and other organizations can have a variety of effects, both positive and negative, on personnel. It is probable that government employees can expect to face impacts similar to those confronted by employees in the private sector.

While the introduction of new and innovative technology usually presents benefits to employees, it can also present impediments which should be addressed and overcome by each organization. Expected impacts on personnel include both technical and organizational impacts.

Benefits

- Benefit of GIS utilization as a decision-making tool
- Improved work quality (through data-based decisions)
- Greater use of information data bases
- Satisfaction of better serving customers
- Better utilization of resources (potential for greater production from fewer people)
- Reallocation of personnel to areas of greater need
- Cost savings realized through a coordinated implementation effort
- Greater demand for services
- Fosters agencies to be cooperative
- Become more efficient when implement GIS

Impediments

- Short-term costs
  - Financial cost of technology procurement (e.g. hardware, software, maintenance)
  - Cost (money, time) of training for staff, customers
  - Impacts of financial costs may include a significant reallocation of resources, such as: program funding into different programs, loss of staffing, and other inherently associated impacts
- Experience/lack of expertise
  - Ability to remain in technology mainstream
- Maintaining a consistent vision by partners involved in a coordinated effort
- Greater demand for services

Transition Issues

There are also additional impacts which will be felt by employees, but do not necessarily have negative or positive implications. These impacts include:

- Employees need to learn to use different tools to do their jobs
- Changes the way employees work through projects
- Increased demand for services
- Employee resistance to change
- Lack of expertise (internal agency support staff)
- Short-term lack of experience utilizing technology
- Cost of marketing/converting clientele to new technology
- Employees uncomfortable with new technology

Standards

Why is it important to standardize? To provide for portability, connectivity, scalability, and a common applications environment for GIS users in Iowa. Relevant standards impact day-to-day business activities. With effective standards, users benefit from extended availability for a wider audience, reduced data capture costs via data sharing, compatibility, interoperability, decreased training costs, and long term solutions to integration. Users determine whether standards are adopted. Standards acceptance is increasing, but is evolutionary. (Exler, 1992)

There are four types of standards (exchange standards, geographic standards, algorithm standards, and interpretation standards). According to the Urban Regional Information Systems Association (URISA), interpretation standards "involve the context in which GIS analyses should be viewed, including issues of data quality and integrity."

Other States
Minnesota has been working on standards for about three years with the state's go info council (the Minnesota Governor's Council on Geographic Information). Their approach has been to first establish a mechanism to propose and approve important standards, and then begin populating them. They have succeeded quite well in the first step, and have found their work in the second area to be very important, but slow going. Their big thrusts today are metadata, identifying ad hoc standards that may have broad value, sorting through parcel standards, and getting involved with federal standards development efforts in hopes of capitalizing on larger efforts.

Exchange standards are important to Iowa as many different GIS platforms will be chosen by Iowa users. When vendors adhere to these standards, Iowans can more effectively share GIS data. While few if any Iowa organizations will develop GIS data structures or even import/export software, the state should encourage/support vendors to follow what has become known as "open GIS" or at least adhere to the Spatial Data Transfer Standard (SDTS) (see below). "The most direct way to influence the computer industry is through procurement specifications that require compliance with standards." (Croswell, 1992)

The Federal Geographic Data Committee (FGDC) is implementing the National Spatial Data Infrastructure (NSDI) under Executive Order. Iowa is both a partner and a beneficiary of those efforts.

With the exception of base mapping, the Iowa GIS community is unlikely to develop or articulate a need to develop standards related to information exchange. These efforts are already underway. For base mapping efforts (e.g. development of county maps for the entire state), it is appropriate to establish and use standard coordinate systems, scale and accuracy to foster data integration. For the border areas, this may extend to cooperation with surrounding states. For other activities, however, the needs of the applications should drive the selection of accuracy and level of data documentation. Interagency and even intra-agency cooperation is required where new data are created, but for a large portion of GIS users, existing data will be adapted for their use. In this case, metadata become at least as important as the scale and accuracy.

Included in the appendix of this report is additional information which may prove useful in determining standards for GIS.

Excellent resources on GIS standards are widely available, especially on the Internet. Two such resources are a paper on the GIS Standards infrastructure by Henry Tom and the GIS Standards Initiatives homepage at the University of Illinois. The US Geological Survey (USGS) also has information on standards at its homepage which can be accessed at: http://www-nmd.usgs.gov/www/html/1stand.html.

Existing and Emerging Technology

We are living in a state of constantly emerging technology. Today's existing technology is just yesterday's emerging technology. The growth of the technology industry continues at rates not experienced by any other industry. The processing speeds of the PC computer double every 18 months alone. Other electronic hardware and software are experiencing similar growth rates as well. The growth of GIS appears to be riding on the coat-tails of this phenomenal trend.

Not long ago, GIS was a tool used only by those organizations large enough to afford it. Expensive work station class machines and seemingly complex and difficult software was required to exploit the usefulness of a GIS system. With the emergence of technology, these demanding requirements continue to diminish. Today, even small organizations can afford to create a highly complex GIS system. Even the home user can use and modify basic GIS functions via inexpensive software and a home computer.

Following is a list of some of the trends that are making GIS accessible to the everyone:
·Larger and faster hard drives
·Faster and cheaper Random Access Memory (RAM)
·Faster processor speeds
·Improved multimedia - CD-ROM and new generation of CD-ROM
·More complex, yet more user friendly computer operating systems
·Faster, more reliable and cheaper electronic hardware
·Networking capability of software
·Greater interoperability of GIS software
·Use of Internet for GIS
·Convergence of CAD/GIS
·Transmission capability
·Modems
·Video tapes to train users
·Using the Iowa Communications Network as a training resource
·Bandwidth will be added through deployment of ISDN, ASDL, cable modems, etc.
·New compression methods to improve speed of transmission

The above items are being used to extract a higher functionality from GIS systems. The following is a list of how that technology is being applied:
·Digital orthographic maps of high resolution
·Lower cost and higher accuracy GPS units
·Powerful and highly integrated GIS software packages
·Use of a remote site for storage data and data access
·Personal communication service

Although technology and GIS continue to grow, there is still room for improvement. The following is a list of areas in which GIS could evolve:

·Distribution medium - Right now it seems as though the Internet is going to be the link that ties everyone together. Currently, however, some systems lengthen the speed at which information can be accessed from the Internet. A higher speed network such as the ICN is far more suitable for issues involving GIS.

·Common GIS platforms - - The ability to share information among organizations will be a key factor in reducing overall costs of GIS and increasing accuracy of GIS systems everywhere.

New and Existing Relationships

Until recent years, use of GIS and GPS technologies has been beyond the reach of small organizations and businesses. However, the cost of using these technologies has fallen. As might be expected, large organizations have taken the lead in employing these technologies in Iowa so far. However, smaller and smaller organizations are becoming interested.

To date, there have been several "leader" organizations in GIS development in Iowa. Each of these has developed an expertise in using GIS technology in certain fields. As such, they are now in the position to act as catalysts in promoting the use of GIS and bringing their partner organizations up to speed more quickly.

The Iowa Department of Natural Resources (IDNR) is the lead organization in Iowa for environmental protection and conservation. The IDNR has extensive GIS data holdings and, along with the State Library of Iowa, has begun development of a Geospatial Data Clearinghouse for Iowa on the Internet World Wide Web, which includes GIS metadata.

The Iowa Department of Transportation (Iowa DOT) is the lead transportation organization in Iowa. As such, it has extensive relationships with counties and cities, which also manage road and street systems. The Iowa DOT also has strong relationships with the regional planning affiliations and metropolitan planning organizations in Iowa through transportation planning efforts. The Iowa DOT has developed a strategic plan for deployment of GIS technology. One very important intergovernmental application of GIS technology in the plan will be the upgrading of the Iowa DOT's Personal Computer-Accident Location Analysis System (PC-ALAS).

The Iowa Department of Education has made extensive use of GIS as an analytical tool for looking at school district consolidation and grade sharing. It has relationships with all local K-12 school districts in Iowa plus community colleges and universities.

The University of Iowa is a major research university and has GIS expertise in a number of fields, including environmental studies, social science, and health care. Relationships are built on a project by project basis.

Iowa State University is the land grant university in Iowa. As such, it has important teaching, research, and extension roles. There is GIS activity throughout ISU, including a GIS Laboratory. ISU has considerable expertise in applying GIS in economic studies, agriculture, natural resources conservation, and transportation. Relationships are project-specific, although there is a strong, on-going relationship between ISU and the Iowa DOT in transportation-related GIS work.

The U.S. Army Corps of Engineers Rock Island District is responsible for the management and development of the navigable rivers in Iowa, including the Mississippi and Missouri. When flooding threatened much of Iowa in 1993, the Corps developed strong relationships with a number of organizations in Iowa, particularly, the Iowa Department of Defense.

The City of West Des Moines and Black Hawk County are examples of local government leaders in deployment of GIS and GPS. West Des Moines is very aggressively employing different

technologies in both public works and public safety. Black Hawk County developed a wide-ranging cooperative approach to GIS base map development.

Several other large organizations are in the process of GIS development. These include the US Department of Agriculture's Natural Resource Conservation Service Iowa office and the Iowa Department of Public Defense, Emergency Management Division. Yet others, including the Iowa Departments of Workforce Development (formerly Employment Services), Public Health, Public Safety, and Economic Development, have a strong interest in using GIS for various tasks. Iowa State University, Workforce Development, and the Iowa DOT are currently exploring a project to improve Workforce Development's employment databases using GIS technology so they can be used effectively for transportation planning and other purposes.

The National Spatial Data Infrastructure (NSDI) was established in the spring of 1994 to promote the development, use and sharing of geographic data throughout the country. NSDI was created by an executive order and directs federal agencies to work with state, local, and tribal governments, universities and colleges, and the private sector to share data.

Another significant new set of players in GIS/GPS in Iowa will be the community colleges. Many of Iowa's community colleges have strong industrial-based computer aided design (CAD) programs. But recently, several have branched off into GIS and GPS to serve key industries such as agriculture and construction. For the last 10 years, Iowa Lakes Community College has offered an industrial CAD program and is now starting a two-year GIS technician program. In addition to offering GIS classes, Hawkeye Community College has also cooperated with Iowa State University, Black Hawk County, Natural Resources Conservation Service, and a variety of private businesses in educational activities.

Particularly in the area of GPS use, the private sector cannot be forgotten. Many of the most promising uses for GPS (e.g. precision farming, civil engineering and construction, and business logistics) are private-sector driven. Two Iowa-based companies (Rockwell and John Deere) are major players in the development and use of GPS technologies. Finally, Iowa's public utilities (including investor-owned and municipal utilities) are adopting technologies such as GIS, CAD, and GPS rapidly. This suggests that public/private partnerships will be key to the future of GPS development in Iowa.

One community where development of GIS and GPS technologies is likely to grow rapidly in the next few years is law enforcement. GPS is of particular interest for state and local law enforcement agencies to assist their officers in the field. GIS is of interest as an analytical tool to help deploy law enforcement resources as effectively as possible.

Private Sector Involvement

The private sector and government entities are in a symbiotic relationship in regard to GIS issues. This relationship requires a great deal of trust, cooperation, and mutual attention to accuracy and open standards. In developing this relationship, civil servants may fear criticism for helping the private sector. There may also be a concern from taxpayers that, in addition to paying taxes, they will have to pay additional fees for GIS data.

Private sector representatives should be included in government technology and telecommunications planning to ensure access to information and data to help maintain and update data. This becomes more important as centralized governmental functions are distributed and outsourced. Sometimes private GIS users have control of the most detailed data; federal and more general users should utilize this data as opposed to generating new, less accurate data.

The private sector is comprised of a large and diverse range of GIS/GPS users. Many have used these technologies for years and more are adopting the GIS/GPS techniques in their businesses.

For discussion on the effects GIS can have on Iowans, see the Economic and Social Impacts section of this report.

Utilities

Utilities are intensive utilizers of GIS/GPS technologies. These include natural gas, water, telephone, cable TV, Internet service providers, and radio/television utilities. The organization of these utilities includes private ownership, corporate ownership, and cooperative ownership. The ownership is further complicated with small/local utilities, regional/medium utilities, and large/national utilities working in a changing and often deregulated environment. Private utilities provide a valuable base map data source which can be utilized by other private sector users, as well as local, state, and federal governmental entities. Private sector telecommunications companies are faced with rapidly changing technology. They may also feel threatened by governmental (Iowa Communications Network) competition, as well as other private sector competition (deregulation and new providers). Deregulation and changes in technology are affecting all utilities. Nonetheless, private sector and governmental entities benefit from accurate GIS information and data sharing.

Transportation and Distribution

Transportation and distribution companies use GIS/GPS technologies widely. These private sector entities include railroads, trucking companies, pipeline companies, and warehouse/distribution companies. Continued consolidation, deregulation, and international regulatory changes such as North America Free Trade Agreement (NAFTA) and initiatives such as NAFTA 35 provide unique opportunities for Iowa (because of location) and companies located in the Midwest to utilize GIS/GPS technologies and data and GIS program sharing.

Agriculture

Several agriculture-related sectors, including individual farmers, consultants, farm management companies, and farm implement manufacturers and dealers, currently utilize GIS technology. Cooperating with government agencies such as the Iowa Department of Agriculture and the US Department of Agriculture, as well as local governments, the agriculture industry could experience many benefits in its utilization of GIS technology.

Real Estate
The real estate sectors including residential, commercial, land, farm, and government are comprised of many private sector GIS/GPS users. These include brokers/realtors, managers, farmers, developers, consultants, and users.

Consultants
Several categories of consultants utilize GIS/GPS technologies. Surveyors and engineers (including civil, construction, and utility engineers) are significant GIS/GPS users. Planners and researchers utilize GIS. As government continues to distribute work to private contractors, accurate and timely data sharing becomes more important.

Manufacturers/Dealers/Wholesalers
The private sector includes a diverse group of manufacturers including proprietary seed companies, farm equipment manufacturers, electrical manufacturers, and consumer goods manufacturers. These private sector players have significant research capabilities and are adopting new technology as well as fine tuning their product mix depending on geographic information system data. Transportation and logistics, as well as other factors affected by GIS data, become important in research and development, manufacturing, distribution, wholesaling, and retailing of products.

Marketing
Several private sector marketing companies utilize GIS/GPS information. Due to Iowa's central location, telemarketers have located in Iowa. Utilizing new data base technologies and GIS information, they are providing value added services to companies nationwide. Several data base companies headquartered in Iowa track nationwide residents by income, age, location, consumer preferences, and many other characteristics. The companies then utilize GIS techniques to provide value added services to private and governmental entities. Retail stores are also utilizing GIS when determining new sites for stores.

Publishing
GIS/GPS technologies are effectively utilized by magazine, newspaper, newsletter, television, radio, and printing businesses. Customers are better served by targeting based on location, demographics and interests. Advertisers are targeted based on subscriber characteristics. GIS technologies are utilized to manage this information.

Insurance/Finance
Banks, pension funds, life insurance, property and casualty insurance, and related businesses including underwriting and actuarial sciences are utilizing these techniques. Companies specializing in GIS/GPS are locating in Iowa and working with both governmental and private sector entities.

Mapping Services
Private sector entities are providing mapping services utilizing GIS/GPS for real estate development of residential, commercial, industrial, and retail areas. Businesses in the transportation industry are utilizing and developing software for boundary, survey, topographic, aerial, and other specialty maps.

Emergency Response
Private sector companies are utilizing GIS in conjunction with governmental agencies to help police, fire, EMT, and hospitals to plan for disasters and emergency response. Accurate data on hazardous materials, effects of climatic conditions, and location of drainage ways, flood hazard, and utilities can be organized utilizing GIS/GPS technologies.

GIS Software and Hardware Vendors
As the use of GIS grows, vendors of GIS software and hardware also grow. By working cooperatively with these companies, reduced prices on software and hardware may be Available to local governments and state agencies who would otherwise not be able to afford this technology.

Cooperation between the private sector and all government agencies is important. Prior planning and close communication is important to anticipate needs and provide economical sources of data for both private and governmental entities. New technologies may make older ways of providing services and distributing products obsolete. Intermodal analyses can be accomplished using GIS to plan for future uses and improve the standard of living for all in society.

The greatest need for accuracy and detail is often at the private sector/local level. Even though federal and state standards may require lower accuracy, the local entities require higher degrees of accuracy for their purposes. Organizations requiring more generalized data can summarize or sample more detailed GIS/GPS data in order to develop more generalized data bases.

Resources Available and Needed

The following GIS resources have been identified to show where some key GIS expertise, data, technology, training, and people can be found. These contacts will help provide a starting point for Iowa GIS users to go to get information about their particular interest.

Many of the GIS resources available for the Iowa GIS community have been identified in the section of this report titled "Environmental Assessment." These resources, from all levels of government, academic institutions, and the private sector, are the places to find GIS expertise, data, technology, and training in the state.

Groups

Iowa Geographic Information Council
(http://www.geo.drake.edu/igic)
David Plazak, Chair
515/294-8103 · dplazak@iastate.edu

Mid-America Geographic Information Consortium
(http://www.geo.drake.edu/magic)
Tim Hensley, President
tim@tyrell.net

National States Geographic Information Council
Hank Garie, President
609/984-6639
hgarie@dep.state.nj.us

Federal Geographic Data Clearinghouse
(http://fgdc.er.usgs.gov/)
John Moeller, Director
jmoeller@usgs.gov

Other State Steering Committees
(http://www.geo.drake.edu/nsgic/links.htm)

Publications and Periodicals

Coordinated GIS
(http://www.geo.drake.edu/igic/newslett.htm)
Reg Souleyrette
515/294-8103
reg@iastate.edu

GIS World
(http://www.geoplace.com/)

Geo Info Systems

Business Geographics
(http://www.geoplace.com/)

GPS World

International GIS Sourcebook
(http://www.geoplace.com/)

Data
Most of the organizations listed in the section titled "Environmental Assessment" produce GIS data. Others that are distributing data include:

Iowa Department of Natural Resources
(http://www.igsb.uiowa.edu/htmls/nrgis/gishome.htm)

Iowa Geospatial Data Clearinghouse
(http://www.igsb.uiowa.edu/center/htmls/geodata/node.htm)

Federal Geographic Data Clearinghouse
(http://www.fgdc.er.usgs.gov/)

Guide to On-line and Mostly Free U.S. Geospatial and Attribute Data
(http://www.cast.uark.edu/~sp/hunt.html)

Key Internet Sites (not listed above)

National Center for Geographic Information and Analysis (NCGIA)
(http://www.ncgia.edu/")

The Essential Guide to GIS
(http://giswww.kingston.ac.uk/esguide/start.html)

Getting to Know GIS
(http://www.esri.com/resources/dtgis/front.html)

USGS - What is GIS?
(http://info.er.usgs.gov/research/gis/title.html)

USGS GIS Links
(http://www.usgs.gov/network/science/earth/gis.html)

GIS Frequently Asked Questions
(http://www.census.gov/geo/gis-faq.txt)

Yahoo GIS Index
(http://www.yahoo.com/Science/Geography/Geographic_Information_Systems_GIS_/)

Education and Training

Iowa Community Colleges

Terry Brase, Hawkeye Community College
319/296-2320 · agfdtech@forbin.com

Roger Patocka, Iowa Lakes Community College
712/362-7950

Drake University

Dennis O'Brien
515/271-2967 · do0701r@acad.drake.edu

Iowa State University

Tom Sanchez
515/294-8103 · tom-sanchez@iastate.edu

University of Iowa

Joyce Baker
319/341-9885 · joyce-baker@uiowa.edu

University of Northern Iowa

Stephen McGregor
mcgregor@csbs.csbs.uni.edu

Technology

Most of the organizations listed in the section titled "Environmental Assessment" use GIS technology. Vendors also are a good source of information regarding GIS technology. A list of companies can be found at:

Yahoo GIS Companies Index
(http://www.yahoo.com/Science/Geography/Geographic_Information_Systems_GIS_/)

People

There are many people working with GIS in Iowa. A good place to find someone who might be able to help would be:

IGIC Steering Committee
(http://www.geo.drake.edu/igic/members.htm)

The is list will continually change. To receive the latest version see:

Iowa Geographic Information Council web page
(http://www.geo.drake.edu/igic)
Kevin Kane
515/281-5815 · kk4631r@acad.drake.edu

Resources Needed

Although the information listed in Resources Available can be found in many locations and in many formats, there is no one good place to access much of this information. Based on an analysis of these resources, there are several actions that could organize the resources to be of the most benefit to all Iowans. The following is a list of the highest priority needs determined by the IITT GIS Task Force which was used to develop the project proposal.

1) Development of an authorized, formalized, funded, and staffed GIS council.

2) Staff and fund the Geospatial Clearinghouse to include:
   - ·people
   - ·organizations
   - ·data
   - ·publications
   - ·training opportunities
   - ·Internet locations for GIS contacts and information

3) Develop an accepted process for accessing, developing, and maintaining standardized GIS data and metadata for intergovernmental use.

4) Develop a GIS resources directory.

5) Develop a networked system for GIS training that extends from universities to all layers of government and private users including internships and sabbaticals.

Other identified needs:

· Develop a means of GIS access for local (purchase contracts, grants, etc.). Negotiate bulk purchases of GIS software to spread over users across the state.

· GIS software that can be used over the Internet to access the Geospatial Clearinghouse.

· Develop a GIS consultation team.

· Develop GIS disaster preparedness and response capabilities.

· Package of GIS tools for economic and community developers.

·Establish a central Iowa public GPS base station for differential GPS.

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Economic and Social Impacts

Positive Impacts

Application of GIS and related technologies can have numerous, positive impacts for the economy and society. This is because these technologies are so versatile and can be applied in so many sectors for so many purposes. Applications range from farming, to education, to law enforcement, to commerce, to government administration, to transportation. Applications may be found in both the private and public sectors. The following table describes a few of the potential applications for GIS and related technologies by sector.

Sector	Impacts
Agriculture	Improved yields with lower input costs and improved environmental quality; better business management and improved profitability
Business Logistics	More productive use of transportation equipment (e.g. trucks, railroad cars, and airplanes)
Defense	More effective military operations
Disaster Services	Quicker response to disasters
Economic Development	Improved information for businesses interested in location or expansion
Education	Improved teaching of geography and other subjects with a geographic component, improved student recruitment, and administration
Government Services	Better planned, managed, and delivered government services
Human Services	Better targeted human services programs; improved integration of human services with other government activities
Infrastructure and Utilities	Improved management of infrastructure systems; greater productivity and lower costs
Land Use/Land Management/ Real Estate	Better information for planning efforts; better planned cities and rural areas; better matching of real estate with appropriate land uses
Law Enforcement and Public Safety	Improved deployment of police, fire, and emergency responders; more rapid response; allocation of scarce resources to areas identified as needing more attention

Natural Resources	Improved management of natural resources; better environmental quality
Public Health	Better information about public health threats
Research	Discovery of new knowledge by combining information in new ways
Retailing/Commerce	Better located retail establishments; more effective use of marketing expenditures
Taxation	Improved property tax administration; automated assessment; better targeting of tax audit resources
Transportation	Safer, more efficient transportation systems; improved system investment decisions

Issues to be Resolved

On the other hand, there are a number of significant, unresolved issues associated with the application of GIS and related technologies. Fundamentally, these include high development costs (if efforts are duplicated rather than done cooperatively), all sorts of legal issues, as well as standards and interoperability issues. These unresolved issues are described in the following table.

Issue Area	Issues to be Resolved
High Costs	Costs of developing GIS/GPS can be very high if duplication of effort is not avoided
Loss of Privacy	GIS systems allow data to be related in new ways, leading to potential loss of personal privacy
Confidentiality Issues	Great care must be taken to avoid disclosure of confidential information about individuals, families, and businesses
Data Ownership Issues	The issue of who owns publicly-developed GIS data is essentially unresolved
Freedom of Information Issues	How much public GIS information must be released and how much can legally be kept confidential to protect privacy or safety?
Bad Decisions	If GIS or GPS data are inaccurate, the result can be very poor decisions on the part of businesses, agencies, and other organizations
Legal Liability	If GIS or GPS data are misused and harm results,

	who is liable?
Standards	Lack of standards for geospatial data can make sharing data difficult if not impossible

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Intergovernmental Cooperation Opportunities

Opportunities abound for intergovernmental partnerships in GIS and GPS development in Iowa. Federal and state agencies often take the lead in the development of GIS for a certain purpose, for instance in flood damage response, law enforcement, or transportation planning.

Iowa's Councils of Governments (COGs), Metropolitan Planning Organizations (MPOs), and Regional Planning Affiliations represent one very viable form of intergovernmental partnership that can be extended to GIS with technical support from partners such as the Iowa Department of Transportation. A number of local intergovernmental consortia have also developed to support GIS. These include the Central Iowa Area Mapping (CIAM) group, the Black Hawk County effort mentioned earlier, and the Vector group in Northwest Iowa. Vector is unique in that it represents a cooperative effort of nine small communities that are not adjacent or even within the same county.

Possibilities for sharing by counties are also going to be great. Many county engineering offices are now using similar CAD packages for road and bridge design. Based on a survey of counties in Northwest Iowa AutoCAD release 13 appears to be the predominant standard; some AutoCAD output files are readily importable into GIS software. They are beginning to use CAD for mapping as well. Several counties have contracted with the Sidwell Company to provide automated cadastral mapping systems for property tax assessment. This raises the possibility of counties sharing expertise with both CAD and GIS.

Both the COG and MPO approaches and the local consortia approach rely on the existence of Chapter 28E of the Code of Iowa, which provides a very flexible and useful form of intergovernmental sharing in Iowa. Local governments and state agencies (but not federal agencies) can make use of Chapter 28E to share almost anything, including GIS systems and systems development.

Experience shows that many aspects of GIS/GPS technology can be shared through partnerships. These include:

- knowledge and expertise
- hardware and software
- technical personnel
- data
- base map development
- applications and products

There are many reasons that intergovernmental partnerships make sense in the GIS/GPS field. Not the least of these is that the learning curve for GIS/GPS can be very steep. About half of the cost has nothing to do with either hardware or software; this often forgotten cost involves data development and development of technical skills among personnel. Significant cost savings can arise through cooperation.

Projects

The following project has been reviewed and recommended by the GIS Work Group. It is the product of several months discussions and is a small step toward the goals identified by the work group.

The work group was asked to submit 3-5 prioritized projects for consideration by the IITT Task Force. After consideration of several project ideas, the work group chose to submit only one project which encompasses three key components to advancing and supporting GIS in Iowa

The project meets all the criteria of the IITT Task Force:

_ The project is realistic and has a reasonable chance for success

_ The project can be fully operational within five years

_ The project involves more than one level of government

_ The project uses interoperable technology

_ The projects are measurable (benchmarks identified)

_ The project does not rely on one source of funds.

_ The project improves services to citizens directly.

Intergovernmental Telecommunications
GIS Work Group
Project Recommendation

Priority: 1

Work Group Chair: Marty Adkins

Proposed Project: Establishment of an Iowa Geospatial Infrastructure

Short Description of Project: This project will establish an ongoing geospatial information coordination infrastructure that will be based within the Iowa Information Technology Services Department. This infrastructure will provide for:

- coordination of intergovernmental and private sector GIS development
- a clearinghouse for geospatial data and metadata
- coordination of GIS educational efforts at all levels in Iowa, and
- linkages with federal and interstate GIS programs

The ultimate result of this project will be improved access to geospatial information and analysis tools for Iowans at all levels of the public and private sectors.

This project involves participation of: x federal government
x state government
x local government
x private sector

This project impacts the following IITT Plan work groups:

x criminal justice and public safety
x general government
x human services
x electronic commerce
x geographic information systems

This project is: x a new project
x an expansion of an existing project
This is a new project added to an existing project

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Benefits to Iowans

Iowans would benefit enormously from the expanded use of GIS in both the public and private sectors. To achieve the goal of widespread, efficient use of GIS in the public sector, public institutions and organizations, along with units of local government, will need to share fiscal resources and technological expertise, develop cooperative GIS training programs, and develop guidelines regarding data format, access, and retention.

This effort will enable geospatial development efforts to be improved by:

- ensuring that Iowa's investment in GIS and related technologies is not wasted through redundancy
- improving service delivery efficiency
- expanding Iowa's access to federal funds
- providing a framework for addressing the issues of:
  - training and data distribution,
  - assessing and prioritizing needs, and
  - developing a strategic plan
- improving access to public records
- promoting cooperative decision making
- facilitating cooperative agreements
- facilitating standards and policy development for GIS data
- leveraging resources to maximize the impact of GIS development
- fully utilizing existing resources such as the Iowa Communications Network to support GIS development in Iowa

Benefits *continued*

Every citizen in Iowa will ultimately benefit from the establishment of an Iowa Geospatial Infrastructure:

Agriculture
Improved yields with lower input costs and improved environmental quality; better business management and improved profitability

Business Logistics
More productive use of transportation equipment (e.g. trucks, railroad cars, and airplanes); more efficient management of shipments and inventories

Defense
More effective military operations

Disaster Services
Quicker response to disasters

Economic Development
Improved information for businesses interested in location or expansion; market analysis; tourist information

Education
Improved teaching of subjects with a geographic component, improved student recruitment, and administration; improved educational opportunities for end users of GIS

Government Services
Better planned, managed, and delivered government services

Human Services
Better targeted human services programs; improved integration of human services with other government activities

Infrastructure and Utilities
Improved management of infrastructure systems; greater productivity and lower costs

Land Use/Land Management/ Real Estate
Better information for planning efforts; better planned cities and rural areas; better matching of real estate with appropriate land uses

Benefits *continued*

Law Enforcement and Public Safety
Improved deployment of police, fire, and emergency responders; more rapid response; allocation of scarce resources to areas identified as needing more attention

Natural Resources
Improved management of natural resources; better environmental quality; improved

public understanding and input on natural resources stewardship issues

Public Health
Better information about public health trends and threats; faster response to epidemics

Research
Discovery of new knowledge by combining information in new ways

Retailing/Commerce
Improved location of retail establishments; more effective use of marketing expenditures

Taxation
Improved property tax administration; better targeting of tax audit resources

Transportation
Safer, more efficient transportation systems; improved system investment decisions

Project Participation
Iowa Geographic Information Council Steering Committee - Project leader
Information Technology Services - Participant
Iowa Department of Management - Participant
Governor's Office - Participant
Regents institutions - Participant and Service Provider
Councils of Governments - Service Provider
Community Colleges - Participant and Service Provider
Center for Transportation Research and Education - Participant and Service Provider
Iowa Department of Education - Participant
Attorney General's office
Professional Associations
Federal Geographic Data Committee's National Spatial Data Infrastructure Competitive Cooperative Agreements program

Project Participation *continued*
Agency/organization liaisons
Business/Industry liaisons

Project Detail
The project consists of three integral parts:
1) a formalized Iowa Geographic Information Council (IGIC) and Coordinator
2) a federally-recognized, state GIS Clearinghouse
3) an IGIC coordinated state GIS Education Network

It is envisioned that the three parts would be related in the following way, under the auspices of the Information Technology Services (ITS).

ITS

IGIC(1) **GIS Coordinator (1)** **GIS Clearinghouse (2)**

Work Groups
·Education
·Standards
·Outreach
·Land Records
·Others as needed
·Technology

Research and Development

Formalization of the IGIC will be accomplished by executive order. The IGIC Steering Committee, the Director of ITS, the Iowa Department of Management , and the Governor's Office will participate in drafting the executive order.

The formalized IGIC will be responsible for:
·assisting and drafting the executive order
·establishing a formal organizational structure, vision, and mission
·developing a working plan
·developing a resource survey
·recommending positional parameters for GIS Coordinator
·facilitating Federal Geographic Data Committee cooperative agreement
·facilitating and participating in regional and state meetings and conferences
·forecasting and achieving project sustainability
·recommending representation to regional and national organizations

Project Detail *continued*

The functions of the GIS Coordinator will include:
·promoting GIS to legislators and professional organizations
·conducting survey and distributing results
·networking with other state coordinators and entities
·directing the Iowa GIS Clearinghouse activities
·assisting and developing the state GIS plan
·providing the support for the GIS Education Work Group
·responsibility for supervising clearinghouse staff and office functions

A major function of the IGIC Education Work Group will be to develop the coordinated GIS Education Network. The GIS Education Network will:
·establish industry needs relative to knowledge and operation of GPS/GIS
·determine math and computer skills needed by K-12 graduates for further GIS education
·establish GIS course guidelines for post secondry education and training
·enhance communication between educational institutions in development of curriculum

·enhance communication between education and industry to establish linkages that will result in internships, assessment of programming and evaluation of graduates
·establish method of needs assessment to determine areas of improvement
·sharing of resources and data through the clearinghouse
·develop on-line GIS educational resources

The GIS Coordinator will provide administrative support to the GIS Education Work Group. The GIS Education Work Group will provide periodic reports to the IGIC.

The GIS Clearinghouse will be responsible for the following:
·IGDC (data, metadata, search)
·Resource directory
  ·People
  ·List of organizations
  ·Data
  ·Links to other GIS related Internet sites
  ·Publications
·Training
·Vendors
·Job postings (opportunities available, looking for jobs)

Project Detail *continued*

The functions of the ITS will include:
·informing legislature of IGIC/coordinate activities
·assisting in developing state plan
·assisting in formulating state standards policies
·exploring legal issues with Attorney General
·developing access policies
·increasing local access to Internet
·negotiate for multi-site software licenses for local governments

The function of the Councils of Governments and Community Colleges will be to:
·promote and host regional meetings with IGIC

Task	**Participants**	**Time frame**
Draft Executive Order	IGIC Steering Committee Director - ITS Iowa Department of Management Governor's Office	March -April 1997
Adopt Executive Order	Governor	May 1997
Obtain funding for	GSA	July 1, 1997

project including coordinator	ITS	
Meeting of formalized IGIC to organize (officers, by-laws, vision, mission, goals, committees, etc.)	IGIC Steering Committee Additional members	July 1997
Recommend and define positional parameters for coordinator	IGIC	September 1997
Survey of existing data, hardware, software, contacts (Baseline)	IGIC	October 1997
Hire Coordinator	ITS	November 1997

Project Detail *continued*

Task	**Participants**	**Time frame**
Regional meetings (8)	IGIC Coordinator Community Colleges Councils of Governments	1st & 2nd quarters 1998
Complete Work Plan	IGIC/Coordinator	June 1998
Follow-up Survey	IGIC/Coordinator	Fall 1998
Secure continued funding	IGIC/ITS/Coordinator	December 1998

The coordinator will make presentations about GIS and the IGIC to professional associations and legislators in early 1998. The IGIC steering committee members will host mini-informational meetings at the regional level to assess needs, directions, and priorities, which will be utilized in developing the work plan.

Project Analysis

	1st Year Project	2nd Year Project	
Formal IGIC/Coordinator			
GIS Coordinator salary/benefits (1.0 FTE)	$60,000	$30,000	
Support costs	$20,000	$10,000	Outreach
(newsletter, travel, surveys, regional meetings)	$15,000	$ 7,500	
Total	$95,000	$47,500	
Enhanced Clearinghouse (IGDC)			
IGDC staff salary/benefits (0.5 FTE)	$25,000	$12,500	
Support costs	$20,000	$10,000	
Equipment/software costs	$20,000	$10,000	
Total	$65,000	$32,500	
Statewide GIS Education and Training Program			
Publishing of GIS education plan/curriculum	$10,000	$10,000	
Travel and meeting costs for subcommittee members	$10,000	$10,000	
Facilitators, web development, ICN time	$20,000	$20,000	
0.0 FTE; however, the GIS Coordinator will spend15-20% of their time to this effort.			
Total	$40,000	$40,000	
Grand Total $320,000	**$200,000**	**$120,000**	

Notes:

Items 1 and 2 project dollars go to ITS. ITS will partially support these budget items with its own dollars starting in year 2 and fully support these budgets in year 3 onward.

Item 3 project dollars will go to IGIC

Other Potential Sources of Funds (Year 2)

$25,000 Federal Geographic Data Committee helps states fund clearinghouses - - establishment of a formalized clearinghouse would greatly increase chances of getting federal funds for the Iowa Geospatial Infrastructure.

$5,000 Matching funds for curriculum from individual educational institutions.

$42,500 State appropriation for half of GIS Coordinator and Clearinghouse staff after one year.

$5,000 Annual Iowa GIS Conference proceeds (very limited)

$2,000 National States Geographic Information Council (also very limited)

Benchmarks

Survey: Baseline in Fall 1997, resurvey in Fall 1998
More agencies/applications/cooperative agreements

Regional meetings - input for formulation of work plan.
Coordinator presentations - educate legislators/local agencies.
Development of work plan by IGIC and coordinator.
Continued funding secured.
Recognition by Federal Geographic Data Committee.
Agencies draft multi-year plans for GIS use.
Increased use of clearinghouse.
Directory of services (from survey).
Increase participatation of organizations signing IGIC Memorandum of Understanding

Barriers to Project

Barrier Lack of understanding of benefits of GIS and related technologies among policy makers.

Barrier Response GIS presentation at Department Director's meetings to solicit support and educate the policy makers. The current members of IGIC should prepare material and script for presentation and select knowledgeable presenter.

Barrier Lack of legislation or executive order authorizing and empowering an IGIC entity to coordinate inter- and intra-state GIS program delivery.

Barrier Response Seek lobby support from current ITS Director and policy makers.

Barrier Lack of formal authority for IGIC.

Barrier Response Recommend ITS sponsor IGIC.

Barrier Lack of administrative support for IGIC

Barrier Response Recommend IGIC support within ITS

Barrier Lack of Funds

- ·Salary
- ·Staff support
- ·Equipment
  - ·Web server
  - ·Hardware and software
- ·Travel expenses
- ·Overhead
- ·Program delivery materials
  - ·Materials
  - ·Mailings
  - ·Software

Barrier Response Recommend that this GIS proposal receive IITT funding. ITS to sustain project after year 2.

Barriers *continued*

Barrier Lack of support in implementation of Iowa Geographic Data Center (IGDC).

Barrier Response One desired outcome of this proposal is that there will be an

increase in support for the IGDC.

Barrier Lack of Training Resources

- ·New and developing technology
- ·Classroom hardware
- ·Classroom software
- ·Coordinated GIS curricula
  - ·Communication (K-12, Community Colleges, Private and Regents)
- ·Instructors
  - ·Instructor development
  - ·Continual upgrading

Barrier Response Project recommends that the IGIC Education Work Group develop a coordinated GIS Education Network to define issues and propose solutions.

Appendix

This Appendix contains information on the following states' efforts at organizing a state geographic information systems organization:

Kansas Geographic Information Systems

Minnesota Geographic Information Systems

Nebraska GIS Steering Committee

Wisconsin Land Information Program

Also included in this Appendix is the following:
Mid-Continent Mapping Center U.S. Geological Survey, Digital Products Status for Iowa

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