Organizational Structure for Local Government GIS

A Survey

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An ESRI White Paper

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Introduction

Local governments are increasingly required to operate with the speed and efficiency of private business while facing ever more complex political and regulatory issues. Local governments must digest an immense amount of information to perform their duties in a fair and sound manner. A geographic information system (GIS) provides the data management tools for the map and spatial data needed to accomplish this task. GIS technology provides a flexible set of tools to perform the diverse functions of government. More important, it makes data sharing among departments possible so that the government can work as a single enterprise.

But GIS is so much more than just technology. At its core is geography, which is a cross-cutting discipline, that affects all aspects of life. Geography is a key element in the decision making, information management, and operation/maintenance of government services.

GIS has five components—data, hardware, software, applications, and people. Developing and incorporating GIS into a multifunctional operation requires considerable attention be paid to each one of its five components to reap the potential benefits. At the center is the sharing of common spatial data. Providing an organizational structure that fosters and promotes that sharing most efficiently can be key to the success or failure of the system. Unlike the technological or data components, which can be isolated, defined, analyzed, and easily manipulated to serve any function, the people (organizational) component requires attention to human resources and relationships, much more nebulous factors.

Environmental Systems Research Institute, Inc. (ESRI), surveyed eleven large cities and counties with GIS to learn how they have set up their organizational structure—what works, what doesn't work. The survey provides some guidelines on how a government could organize itself to most effectively incorporate GIS into its daily operations. Survey results are summarized below. Individual responses of the organizations are provided in Appendix A.

Executive Summary of Survey Results

GIS organizational structure questions and responses are as follows:

1. Describe the GIS organizational structure and how it is operated. (Table 1)

Have a Policy Committee	8 out of 11
Have a Technical Committee	7 out of 11
Have a Department/Division Serving the Entire Organization	6 out of 11
Have a User Group	3 out of 11
Have GIS Staff within Departments	5 out of 11

2. How was the organizational structure developed? (Table 2)

From Top-Down Directive	3 out of 11
Began in a Single Department	4 out of 11
Began with a Multi-User Needs Assessment/Design	3 out of 11
Evolved from a Single Focus to Multi-User Decentralized	5 out of 11

3. Was there a "Team of Two" (a champion at the policy level and a technical lead) to act as catalyst throughout the organization? (Table 3)

Policy Level Catalyst	7 out of 11
Technical Level Catalyst	8 out of 11

4. Where is the GIS organization located within the jurisdiction's structure? (Table 4)

Information Technology/Systems Dept.	3 out of 11
County Administrator's/Mayor's Office	3 out of 11
Independent Group/Department	4 out of 11
No GIS Service Organization—Each Dept. Has Own GIS Staff	3 out of 11

5. What are the GIS organization's functions? (Table 5)

Technical Leadership/Coordination	10 out of 11
GIS Programming	4 out of 11
Project Implementation Services	7 out of 11
Training Services	4 out of 11
Database Design	4 out of 11
Database Creation/Maintenance	9 out of 11
Data Clearinghouse/Standards	5 out of 11
Hardware/Software/Maintenance Services	2 out of 11
Internal/External Agreements	3 out of 11
Public Information Services	1 out of 11
GIS Promotion/Marketing	1 out of 11

6. How are standards developed and enforced? (Table 6)

Developed by Consensus of User Departments	1 out of 11
Developed by GIS Organization	5 out of 11
Enforced by GIS Organization	4 out of 11
Developed/Enforced by Each User Department	2 out of 11
Act as a Clearinghouse/Standards Promotion Only	3 out of 11
Enforced by Peer Pressure	2 out of 11

7. Where has the organization succeeded in making GIS work? (Table 7)

Cost Recovery for Products/Data	1 out of 11
Common Data Sharing (Road, Parcel, Basemap Layers)	5 out of 11
Providing Technical Assistance Services to User Departments	2 out of 11
GIS Organization's Facilitator/Coordinator Role	3 out of 11
Data Sharing Agreements with Outside Agencies	3 out of 11
Staff Role Expansion	1 out of 11
Strong Policy Committee	2 out of 11
Standard Policies/Procedures	2 out of 11

8. What have been the problems? (Table 8)

Magnitude of Effort Required To Move to an Enterprise System	4 out of 11
Quick Products vs. Well Planned Long-Term Database	1 out of 11
Finding/Using Successful Funding Strategies	5 out of 11
Lack of Top-Down Support	3 out of 11
Unsuccessful GIS Organizational Structure	3 out of 11
Maintaining Qualified Staff	2 out of 11

9. Is there an available diagram of the organizational structure, by-laws, or meeting minutes or other examples of how the organization is run?

If this information was provided by the respondent, it is included in Appendix A.

10. Describe the technical environment. (Table 9)

If this information was provided by the respondent, it is included in Appendix A.

11. Describe how the organization deals with, or what role it plays regarding, the diversity of GIS and CAD software and the linking and coordination of mainframe and legacy systems/data. Describe how the organization deals with interdepartmental rivalry for funding, and so forth. (Table 10)

Standardized on Hardware/Software Products	1 out of 11
Periodic Batch Upload/Download between GIS and Mainframe	5 out of 11
Encourage Use of Standards	6 out of 11
No Interdepartmental Rivalry for Funding	4 out of 11
Migrating Mainframe Databases to SQL Client/Server Environments	1 out of 11

ESRI wishes to thank the following organizations for their participation in the survey:

- Clark County, Nevada
- Metro Dade County, Florida
- King County, Washington
- Loudoun County, Virginia
- Pima County, Arizona
- Prince William County, Virginia
- City of Los Angeles, California
- City of Philadelphia, Pennsylvania
- City of Oakland, California
- CAGIS (City of Cincinnati, County of Hamilton, Cincinnati Bell, and CG&E, Ohio)
- LOJIC ([City of] Louisville [and] Jefferson County [Kentucky] Information Consortium)

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Table 1

1. Describe GIS Organizational Structure and How It Is Operated.	Have Policy Committee	Have Technical Committee	Have GIS Department/ Division Serving the Entire Organization	Have User Group	Have GIS Staff within Departments
CAGIS, OH	Yes	Yes		Yes	
Clark County, NV	Yes	Yes—Data Committee	Yes		
Dade County, FL		Yes	Yes	Yes	Yes
King County, WA	Yes	Yes	Yes		Yes
Los Angeles, CA	No				Yes
LOJIC, KY	Yes	Yes	Yes	Yes	Yes
Loudoun County, VA	Yes				
Oakland, CA	Yes	Yes			
Philadelphia, PA	Yes	No	Yes		
Pima County, AZ	No	No	Yes		
Prince William County, VA	Yes—Atypical Structure	Yes			Yes

Table 2

2. How Was the Organizational Structure Developed?	From a Top-Down Directive	Began in a Single Department	Began with a Multi-user Needs Assessment/Design	Evolved from Single Focus to Multi-user Decentralized
CAGIS, OH				Yes
Clark County, NV	Yes			Yes
Dade County, FL		Yes		Yes
King County, WA	Yes			
Los Angeles, CA			Yes	
LOJIC, KY			Yes	
Loudoun County, VA		Yes		Yes
Oakland, CA		Yes		
Philadelphia, PA			Yes	
Pima County, AZ	Yes			
Prince William County, VA		Yes		Yes

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Table 3

3. Was There a Team of Two?	Policy Level Catalyst	Technical Level Catalyst
CAGIS, OH	Yes	Yes
Clark County, NV	Yes	
Dade County, FL	No	No
King County, WA		
Los Angeles, CA		Yes
LOJIC, KY	Yes	Yes
Loudoun County, VA	Yes	Yes
Oakland, CA	Yes	Yes
Philadelphia, PA	Yes	Yes
Pima County, AZ	Yes	Yes
Prince William County, VA		Yes

Table 4

4. Where Is the GIS Organization Located within the Jurisdiction's Structure?	Information Technology/ Systems Deptartment	County Administrator's/ Mayor's Office	Independent Group/ Department	No GIS Service Organization—Each Department Has Own GIS
CAGIS, OH			Yes	
Clark County, NV		Yes		
Dade County, FL	Yes			
King County, WA			Yes	
Los Angeles, CA				Yes
LOJIC, KY			Yes	
Loudoun County, VA		Yes		
Oakland, CA	Yes			
Philadelphia, PA		Yes—Coordination Role		Yes
Pima County, AZ			Yes	
Prince William County, VA	Yes			Yes—In Process of Decentralizing from IRM

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Table 5

5. What Are the GIS Organization's Functions?	Technical Leadership/ Coordination	GIS Programming	Project Implementation Services	Training Services	Database Design	Database Creation/ Maintenance	Data Clearinghse/ Standards	Hardware/ Software Maintenance Services	Internal/ External Agreements	Public Information Services	GIS Promotion/ Marketing
CAGIS, OH	Yes	Yes	Yes	Yes	Yes	Yes					
Clark County, NV	Yes		Yes			Yes			Yes		
Dade County, FL	Yes	Yes	Yes		Yes	Yes					
King County, WA	Yes			Yes	Yes	Yes	Yes	Yes			
Los Angeles, CA	Yes										
LOJIC, KY	Yes		Yes	Yes		Yes	Yes		Yes		
Loudoun County, VA	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes	
Oakland, CA						Yes	Yes				
Philadelphia, PA	Yes						Yes		Yes		
Pima County, AZ	Yes	Yes	Yes			Yes					Yes
Prince William County, VA	Yes		Yes			Yes	Yes				

Table 6

6. How Are Standards Developed and Enforced?	Developed by Concensus of User Departments	Developed by GIS Organization	Enforced by GIS Organization	Developed/ Enforced by Each User Department	Act as Clearinghouse/ Standards Promotion Only	Enforced by Peer Pressure
CAGIS, OH	Yes					Yes
Clark County, NV					Yes	
Dade County, FL		Yes			Yes	
King County, WA		Yes	Yes			
Los Angeles, CA				Yes	Yes	
LOJIC, KY		Yes	Yes			
Loudoun County, VA				Yes		
Oakland, CA						Yes
Philadelphia, PA		Yes	Yes			
Pima County, AZ						
Prince William County, VA		Yes	Yes			

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Table 7

7. Where Has the Organization Succeeded in Making GIS Work?	Cost Recovery for Products/Data	Common Data Sharing (Road, Parcel, Basemap Layers)	Providing Technical Assistance Services to User Departments	GIS Organization's Facilitator/ Coordinator Role	Data Sharing Agreements with Outside Agencies	Staff Role Expansion	Strong Policy Committee	Standard Policies/Procedures
CAGIS, OH								
Clark County, NV		Yes		Yes				
Dade County, FL			Yes					
King County, WA		Yes	Yes					
Los Angeles, CA		Yes						
LOJIC, KY	Yes	Yes		Yes	Yes	Yes		
Loudoun County, VA					Yes		Yes	
Oakland, CA								Yes
Philadelphia, PA				Yes				
Pima County, AZ					Yes			
Prince William County, VA		Yes					Yes	Yes

Table 8

8. What Have Been the Problems?	Magnitude of Effort Required To Move to an Enterprise System	Quick Products versus Well-Planned Long-Term Database	Finding/Using Successful Funding Strategies	Lack of Top-Down Support	Unsuccessful GIS Organizational Structure	Maintain Qualified Staffing
CAGIS, OH	Yes					
Clark County, NV		Yes	Yes			
Dade County, FL			Yes			
King County, WA						
Los Angeles, CA				Yes	Yes	
LOJIC, KY	Yes					Yes
Loudoun County, VA					Yes	
Oakland, CA			Yes	Yes	Yes	
Philadelphia, PA						Yes
Pima County, AZ	Yes		Yes	Yes		
Prince William County, VA	Yes		Yes			

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Table 9

10. Describe the Technical Environment	Square Miles	Population/ Number of Parcels	LAN Servers/ Workstations	PCS/X-emulation	Estimated Number of Users
CAGIS, OH	414	NR/370,000	7/20	50–400/8	
Clark County, NV			75–100	50	
Dade County, FL	2,000	2 Mil.+/450,000	7/NR—in Departments	NR/NR	58
King County, WA			At Least One per Department/NR	250+/NR	250+
Los Angeles, CA					200–250 Desktop Users/30 Workstation Users
LOJIC, KY	390	625,000/260,000	4/68	400/10	200 Desktop Users/125 Workstation Users
Loudoun County, VA	520	119,000/NR	1	31	
Oakland, CA					250+ Desktop Users
Philadelphia, PA	136	5 Mil./700,000	3/15	3,000	
Pima County, AZ					20 Workstation Users/50 Desktop Users
Prince William County, VA			1/Some NR	Numerous/ Numerous	

NR = No Response

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Table 10

11. Issues—GIS/CAD, Mainframe/ Legacy Systems, Interdepartmental Rivalry	Standardized on Hardware/ Software Products	Periodic Batch Upload/Download of Data between GIS and Mainframe	Encourage Use of Standards	No Interdepartmental Rivalry for Funding	Migrating Mainframe Databases to SQL Client/Server Environments
CAGIS, OH				Yes	
Clark County, NV	Yes	Yes			
Dade County, FL		Yes	Yes		
King County, WA			Yes		Yes
Los Angeles, CA			Yes		
LOJIC, KY		Yes	Yes		
Loudoun County, VA				Yes	
Oakland, CA			Yes		
Philadelphia, PA		Yes	Yes	Yes	
Pima County, AZ		Yes			
Prince William County, VA				Yes	

Key Findings

Eleven responses to the survey were provided by six counties, three cities, and two consortiums. Each of the respondents also involves external user organizations in its shared GIS. Characteristics of the respondents' size are

- Population Served = 120,000–5,000,000
- Number of Parcels = 260,000–1,000,000
- Square Miles Covered = 100–2,000

Several have been in operation for five to ten years—in on the ground floor of GIS, so to speak. Their early years were focused on database development (i.e., basic shared data layers—basemaps, parcels, and centerlines with addresses) and project/specific application-oriented implementation. This required a fairly substantial investment in staff—training them to learn GIS software, data automation, geographic analysis methods, cartographic production, information management techniques, and a host of other skills not normally developed/utilized in the local government arena.

The respondents are now in a shift-focus mode, prompted in large part by the movement of the hardware/software to the desktop. Certain elements are receiving more attention (e.g., serving larger numbers of users with some relatively simple display and query needs), and good organizational structures are solidifying and growing as shared databases have become commonly available.

Along the way, through the ups and downs of building a GIS, the respondents amassed a fairly substantial amount of experience and insight about how to best reorganize human resources to employ the new technology toward old concepts (i.e., providing improved community services more efficiently to residents/taxpayers). They've done much of the groundwork for defining organizational strategies that will support a successful GIS in a large government organization environment. The following summarizes their appraisal of what works and doesn't, and why.

GIS Committees and Technical Support Staff

Ten of the eleven respondents identified an organizational structure with some variation of the following components: policy committee, technical committee, user group, and a GIS technical support staff for the enterprise. In all cases this structure supports a distributed GIS with shared data. Figure 1 illustrates a common form of this organizational structure.

1. Steering or Policy Committee

It is important to have a steering committee that is actively involved in the decision making process, providing leadership and direction in the organization's GIS development. Executive level support and the support of political appointees is particularly important in large GIS organizations. In the absence of a steering committee with decision making power, the GIS agency/department is forced to take on more of a coordination/education/marketing role. This makes GIS implementation much more fragmented and slower.

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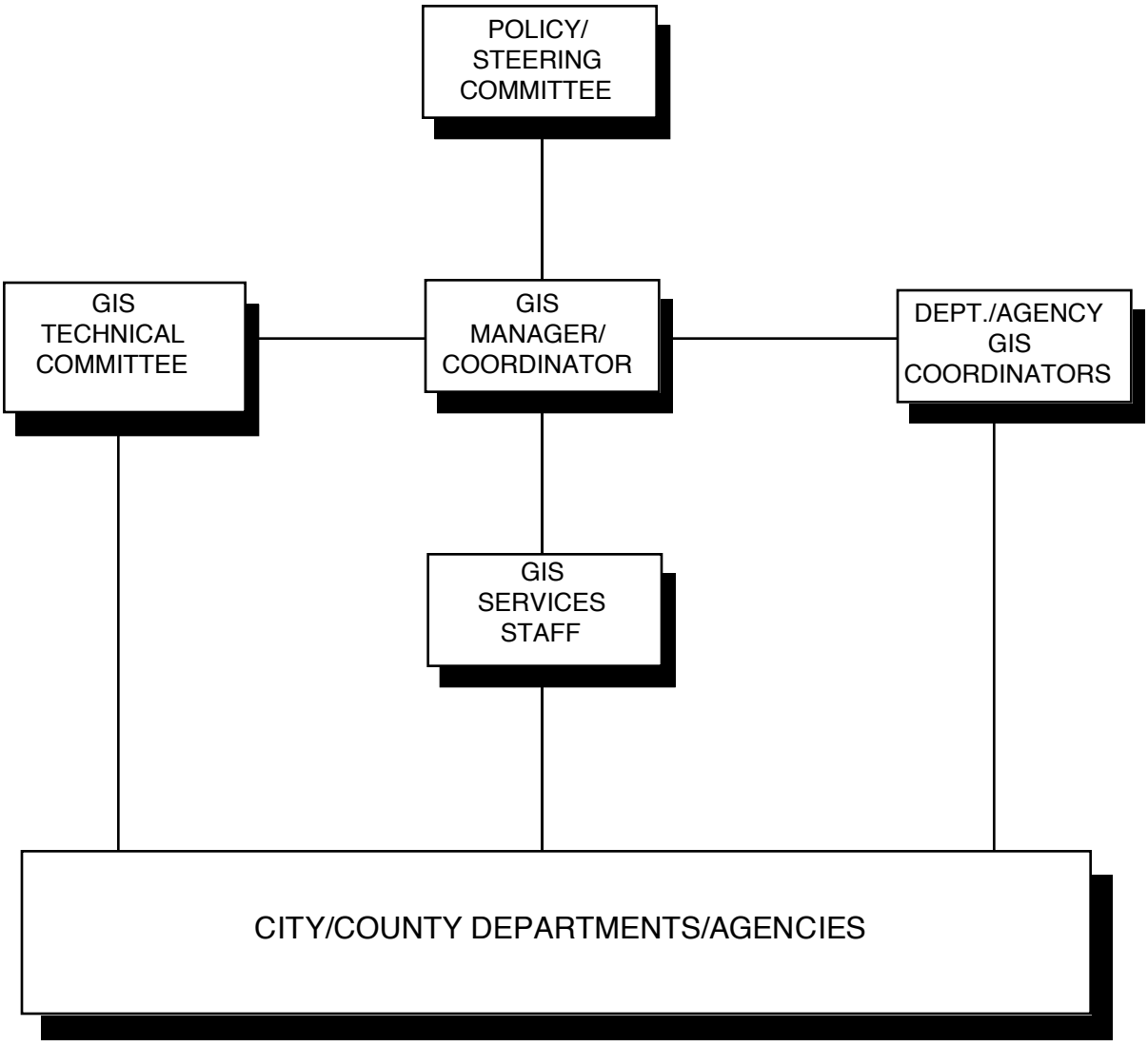
Figure 1

Common GIS Organizational Structure For Local Government



The steering committee's composition is often department heads and top-level administrators, or their designated representative, from participating departments, cities, and organizations. Some local government GIS enterprises have incorporated other entities, such as utility companies, into the GIS and steering committee structure. Regular meetings are held monthly or quarterly, as established by the committee.

Responsibilities of the steering committee generally include the following:

- Status review
- General oversight
- Policy formulation
- Finance and budget decisions
- Growth and expansion of participant base
- Approval of special license agreements
- Product pricing
- Provide direction to the GIS Department

2. Technical Committee

The technical committee can serve as a means of interdepartmental/interagency communication and cooperation. It is generally composed of the technical lead person from each participating department (i.e., the GIS software "power" user for database or application development or the system administrator). Regular meetings are held monthly or quarterly, as established by the committee.

Responsibilities of the technical committee generally include the following:

- Provide technical direction.
- Recommend projects and studies.
- Recommend database/application development.
- Address system integration/expansion issues.
- Conduct user training.
- Determine product policies.

3. User Groups

User groups provide an open forum for all GIS users. GIS implementation is multifaceted. It supports many different types of daily functions, interfaces with many other systems, operation on many different platforms, and support for a vast range of simple to very complex analyses. GIS implementation must also keep pace with rapid technology change and therefore requires continued attention to providing users with educational information and tips. From the opposite perspective, GIS implementation requires a means for users to provide their system support staff with input on how best to serve their needs. A user group serves these functions well. This element will probably continue to grow in importance in the organizational support of GIS because of the movement of technology to the desktop.

Most user groups have no official responsibility and no budget, but may be consulted by steering and technical committees for input into decision making about GIS expenditures for data, applications, and systems.

User group meetings may include presentations and discussions to address data, applications, systems, resources, and other issues of importance to users.

4. GIS Manager and Staff for the Enterprise (GIS Services Department)

The GIS services staff provide technical and database services for the shared system and usually report to the policy/technical committees. GIS services staff for the enterprise can be its own department, or a part of the city/county management information services department, or under the city/county administrator. It can also be part of one participating department, if that department has taken the lead in GIS implementation with the expressed intent of migrating it to a full consortium over time.

In the larger GIS enterprises, GIS services staff usually number ten to fifteen persons headed by a GIS manager/coordinator. Staff may consist of a combination of GIS analysts, GIS applications programmers, system administrators, hardware/software technical support specialists, and trainers.

Responsibilities of GIS support staff generally include the following:

- Provide technical leadership to participants.
- Perform GIS programming, also integrated services programming.
- Provide project implementation services.
- Provide training services.
- Perform database design.
- Provide maintenance for the core central data layers.
- Perform database maintenance.
- Provide technical coordination for departments.
- Provide technical support services to user departments.
- Develop and enforce standards.

5. Departmental GIS Managers and Staff

Departmental GIS staff provide technical and database services for the department's functions. Departmental staff may be composed of a departmental GIS manager/coordinator and technical staff with database maintenance, applications programming, and system administration skills.

Responsibilities of departmental GIS staff may include the following:

- Provide technical support services to departmental users.
- Define and program departmental GIS applications.
- Implement departmental GIS projects.
- Provide maintenance for departmental data sets.

Top-Down Leadership

A key success factor noted by several organizations responding to the survey was top-down direction/leadership for GIS implementation. A top-down directive, coupled with a thorough design process (needs assessment and realistic implementation plan) and funding secured to implement as planned, provides a high probability of successful GIS development and growth.

This approach can be done with one agency taking the lead, as exemplified by the Metropolitan Sewer District (MSD) with the Louisville and Jefferson County Information Consortium (LOJIC). The agency should plan for co-ownership with other participants over time, with dissemination/decentralization/sharing in cost and management (e.g., form a consortium) and with lease/purchase agreements over a ten-year period.

GIS Champion

A GIS champion at the policy level can act as a catalyst for funding support. Survey results show that having a GIS champion at the executive level is important both in obtaining a political support base and in convincing management of the benefit of proceeding with GIS implementation. Several factors contribute to the need for a GIS champion to educate and motivate government leaders: the enterprise nature of GIS, its multidimensional composition (the five parts of a GIS), and the fact that it provides the impetus for a change in the way government does business. The GIS champion should be one who can help establish funding mechanisms and agreements, for example, through some combination of general funds, development/internal services, data sales, and licenses.

Technical Standards

The development and enforcement of standards, primarily for data but also for software/hardware, is a major support mechanism in a successful GIS organizational structure. The need for and use of GIS standards in local government operations have grown in importance with the evolution toward the enterprise environment. In earlier years there were no, or limited, standards governing data development or system integration. Today there is greater reliance on standards, as more data are developed and shared in the enterprise and more users are added. A user's own data, however, are not necessarily subject to these standards.

In most cases, standards have been developed by the GIS support services agency, sometimes in cooperation with user departments. "Enforcement" of standards has also been done successfully by the GIS agency on a variety of levels.

On an informal level, data standards can be enforced by requiring on-line metadata documentation of the quality and heritage of data. This approach allows the users to decide whether the available data can be used for their own purposes. Data standards can also be enforced informally by peer pressure from user departments or by encouragement or guidance from the GIS agency.

On a more formal basis, data standards can be enforced by having the GIS agency perform quality control checking of departmental data sets before they can be published to the general database server or distributed by other means to the enterprise participants. Data standards can also be enforced by increasing service costs to any user not following established standards, or by denying access to the shared database to users who do not follow standards in their own data production.

GIS Staff Development

Focusing on GIS staff growth, that is, developing and retaining GIS staff, particularly for the GIS support services agency, is another key element in organizational strength and viability. This involves supporting continued staff training, expanding staff roles, and increasing compensation levels to keep pace with staff growth and to rival pay scales found in the GIS marketplace.

System Integration

Survey respondents have found that the GIS support services agency functions well in a lead role in integrating GIS with other systems (i.e., GIS links to legacy data, CAD systems, and imaging systems). The steering committee may be instrumental in identifying priorities for system linkages, but determining the mechanics for accomplishing those linkages is best invested with the GIS support services agency. The GIS agency can provide technical expertise in defining a data exchange strategy and data exchange protocols and procedures. Up to this point, most government GIS organizations surveyed have addressed mainframe/GIS data linkages by establishing a regular download routine rather than an interactive link.

Departmental use of independent, nonconforming databases, software, and hardware can result in technology bottlenecks costing time and money. The GIS support services agency can be instrumental in setting standards for data format, software, and hardware for the enterprise system. For example, standards seem to govern the GIS/CAD data exchange arena in most of the government GIS organizations surveyed.

Common Spatial Data

Common spatial data needs can provide a catalyst for interagency cooperation and teamwork, thus changing old ways of doing business. The sharing of spatial data fosters a team approach to problem solving. Spatial data can be used as the vehicle for integrating major systems under revamp/development (i.e., E-911/GIS integration).

Unified Approach

The GIS organizational structure must be built with a comprehensive understanding of the breadth and complexity of successful enterprise GIS implementation. It must set realistic goals, clarify user needs, develop an implementation strategy that serves to meet these needs, share implementation tasks/costs, and focus on steady progress toward goals.

Several respondents noted that what doesn't work is an unfocused, disunited approach to GIS development, in which a few are saddled with all the development costs. GIS should be built as a distributed system, with other departments buying into and co-owning the enterprise. Some survey results indicated that GIS was established by two/three departments/agencies who were very proactive with GIS because they foresaw high potential benefits for supporting/improving their own operations. Thus they initially committed to a disproportionate share of the cost of database/system development. If over time, however, they don't see that others joining in to use the system are contributing equitably to its continued funding, resentment can build and the supporting organizational structure break down (i.e., funds are shifted away from GIS).

Several of those surveyed indicated that the GIS evolved from one department initially starting it up to serve its own needs. This was an operations/development focused department (e.g., a planning department, environmental management department, public works department), not the centrally focused MIS or city administrative office. Placing the GIS support staff within an operations/development focused department doesn't work well for evolving into an enterprise environment where other departments contribute to the funding support of the GIS operation. The department's single focus and priorities make it "nonneutral territory."

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Appendix A

Questionnaire Responses

Responses have been included for those agencies from which permission was received prior to printing of this white paper.

Clark County, Nevada

1. Describe the GIS organizational structure and how it is operated.

The Geographic Information Systems Management Office (GISMO) is a separate County department with responsibility and authority for County-wide GIS resource development. The GISMO is also responsible for regional coordination. Multiple agencies throughout southern Nevada participate through interlocal agreements. The program is coordinated by a two-tiered committee structure: a policy committee, with three agency representatives, that establishes funding participation and development priorities; and a data committee, consisting of technical staff, that meets once per month on issues of status, standards, and data sharing.

2. How was the organizational structure developed?

In 1980, the Planning Department became ESRI site number 14. The first project was based on automated mapping with no other related data or system administration until 1986. Other departments then started to request services. A top-down mandate came from the progressive County manager, who wanted a multidisciplinary GIS, flexible enough to work with other agencies in the Southern Nevada region.

This involved a pilot, an implementation plan done by a consultant who recommended a central coordinating body, a separate entity from the MIS or other departments. It was very successful.

3. Was there a "Team of Two" (a champion at the policy level and a technical lead) to act as catalyst throughout the organization?

The County manager's assistant was the chair of the pilot committee. He continued to chair it until the implementation plan was developed, championed through hiring the GIS manager.

4. Where is the GIS organization located within the jurisdiction's structure?

While the GISMO acts as a separate department, it is actually a division of the manager's office. It reports to the assistant County manager in charge of development or service activities.

There is a great deal of support in the manager's office, which is interested in using improved technology to save resources and dollars. The MIT Department was unprepared; its expertise lies with different tools that are more accounting related.

5. What are the GIS organization's functions?

The GISMO has three mission components:

1. County-wide GIS resource development

2. Regional coordination and implementation support

3. The 911 emergency response street file for the entire Clark County area regardless of jurisdiction

From a regional coordination perspective, the GIS manager has twelve bosses: internal County departments plus dealing at the midexecutive level to facilitate resource sharing within agencies and departments and buy-ins.

- Policy functions = external: agency directors, interlocal agreements to foster shared development throughout southern Nevada

- Technical functions = internal: technical aspects, staff representatives from departments, good system development

6. How are standards developed and enforced?

The main role of the department is to develop and enforce standards by acting as a clearinghouse for GIS data (repository), documentation, metadata, truth in labeling (quality rating), and telecommunications access. Individual users make the decision on whether they can use the data "as is" for their own purpose. The department's role is to ensure that users understand the content, quality, and applicability of the data they are receiving.

Internal cartographic standards are set and followed. These serve to convey a standard look and feel for all County maps, and the standard format/design makes system navigation and use easier.

7. Where has the organization succeeded in making GIS work?

GIS is used in many County departments including the Assessor, Planning, Public Works, Building Department, Police, Fire, Parks, Elections, Emergency Management, executive decision makers, and others.

The Assessor uses GIS to support the volume of growth that equals an average of thirty new subdivisions per month, with fifty last month.

All conversion is based on survey control. Parcels and streets are orthophoto-derived and maintained with survey data.

Street centerlines are used as the basis for election districts and precincts.

A key incentive for users is the control based data, which allows the departments to focus on how to project features on the basemaps rather than on registration issues. This promotes coordination.

8. What have been the problems?

- Should have expedited the street centerline conversion process. Would have created street centerlines earlier to support any and all address-related analysis such as pavement, E-911, and so forth.
- Constant debate over trying to please management with quick products versus well-defined and planned long-term database.
- Dollars versus executive support

9. Is there an available diagram of the organizational structure, bylaws, or meeting minutes or other examples of how the organization is run?

See Figure 2.

10. Describe the technical environment.

There are 75–100 DEC Alpha servers, with ArcView GIS on approximately fifty PCs, stand-alone and networked. We are currently implementing Oracle.

11. Describe how the organization deals with, or what role it plays regarding, the diversity of GIS and CAD software, and the linking and coordination of mainframe and legacy systems/data. Describe how the organization deals with interdepartmental rivalry for funding, and so forth.

Many mainframe applications, such as assessor's tabular data, are extracted nightly to populate the GIS files. This process is very effective. If captured originally on GIS, the reverse occurs, and land use codes are extracted to populate the tabular side.

CAD data come in from developers. GISMO converts it using the DXFARC command and provides DXF to the development community. ARC/INFO and ArcCAD are major software components.

There is competition between departments for funding. An extra rating is obtained with the County if your department can enhance the operation of multiple departments. GISMO always rates high because of this. Funding is offset by data sales.

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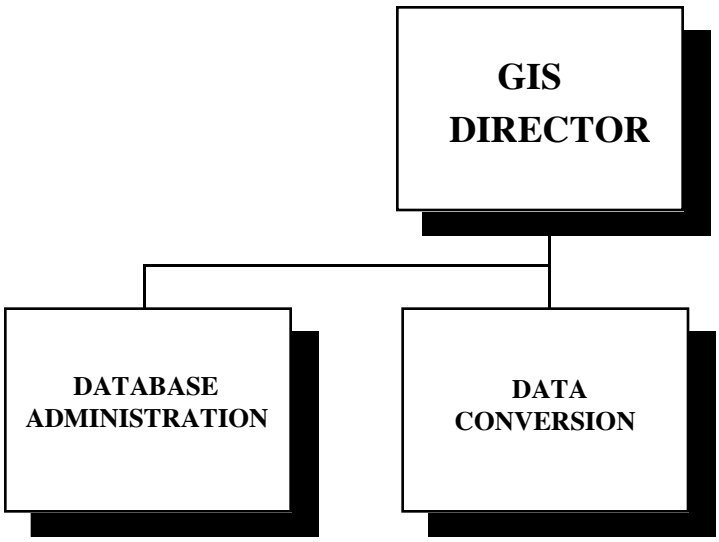
Figure 2



Mission

GISMO develops and coordinates the County-wide use of geographic information system resources to ensure their efficient use and to maximize public benefits.

Description

GISMO coordinates the acquisition, use, exchange, and dissemination of geographic information between departments and local entities. Through interlocal agreements and grant funding, governmental entities agree to pay for GIS services and administration. GISMO facilitates communication through meetings, local conferences, and newsletters to ensure that all GIS data users are informed and trained on systems capabilities.

GISMO monitors and administers GIS resource usage and enforces standards, user agreements, and contracts. GISMO develops and promulgates standards for data acquisition, data quality, formats, application integration, and maintenance related to geographic information. GISMO has in-house data conversion expertise to assist users with the planning and implementation of resources that cannot be contracted or otherwise converted. In addition, GISMO maintains the Emergency Response 9-1-1 dispatch base file.

Metropolitan Dade County, Florida

1. Describe the GIS organizational structure and how it is operated.

The Information Technology Department (IT Department) has managed the County's GIS infrastructure since 1987 including central hardware and software and production data. There is a GIS Technical Support Group (staff of 16) within the Department that administers the system, provides technical support to the application developers, establishes standards, performs research and development tasks, and determines future strategies. The IT Department provides data on request and GIS services on an ad hoc basis. The central system currently has around twelve departments using it directly; another twelve plus departments download data or place ad hoc requests.

Individual departments—Police, Fire, Property Appraiser, and so forth—obtain application services from the IT Department or they hire their own technical staff to build applications using ARC/INFO® or ArcView® GIS software. Although most users use the central GIS platform, some departments own their own workstations, servers, and so forth. The Technical Support Group encourages GIS developers from all County departments to share their data by providing a copy of all coverages and/or tables that they create. These data are then available from the central host machines or other data servers. For the most part, the County has kept the ESRI product line as the standard.

A County-wide GIS User Group was formed in 1994. The group meets quarterly, while more technical meetings for the applications developers are held on the off months. The Office of Management and Budget has often requested the user group to approve GIS expenditures.

Although there are now twenty-nine different municipalities in Dade County, no formal intergovernmental agreement exists. Data, technical support, and technology transfer is done in an informal manner.

2. How was the organizational structure developed?

There were a number of departments that were interested in the technology and provided "seed" money for the initial purchase; however, the implementation was designed and coordinated by the Information Technology Department. After the initial implementation with only a street network as the basemap, a number of years were spent "selling" the technology throughout the County in order to obtain funds for a parcel basemap and the continued growth of the infrastructure.

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3. Was there a "Team of Two" (a champion at the policy level and a technical lead) to act as catalyst throughout the organization?

Not really, since no formal policy was established in the beginning.

4. Where is the GIS organization located within the jurisdiction's structure?

GIS is located in the IT Department. Yes, it has always been located here. The IT Department was already the central location for many of the County's databases and housed the technical staff required to implement the new technology.

5. What are the GIS organization's functions?

As described in number 1, the IT Department's primary objective is to provide a reliable GIS infrastructure. A key component of that is supporting the applications for the maintenance of the basemap layers and, in some cases, maintaining the layers as well.

6. How are standards developed and enforced?

Standards are just now being established in a more formal fashion after many years of informally setting them. Since the IT Department has not been given the power of enforcement, we can only encourage the user departments to follow them to gain the most from the system.

7. Where has the organization succeeded in making GIS work?

Having a centralized system that has been available to any department needing GIS services has been the key to its success. The GIS User Group has helped a great deal to spread the knowledge and introduce GIS tools to other departments.

8. What have been the problems?

Funding the GIS infrastructure has been a major problem from the beginning. The Office of Management and Budget does not include it in the "general fund." Instead, certain enterprise departments, such as Environmental Resources Management, Water and Sewer, Solid Waste, and Zoning, are required to pay for a majority of the costs, with the Information Technology Department covering the rest. Placing the financial burden on just a few departments introduces budgeting problems for them as well.

9. Is there an available diagram of the organizational structure, by-laws, or meeting minutes, or other examples of how the organization is run?

No response.

10. Describe the technical environment.

- Dade County, Florida

  - Population: 2,000,000+
  - Square Miles: 2,000
  - Street Network: 97,000 Arcs
  - Parcels: 450,000 (Information for 300,000 related condos through tables)

Below lists the hardware/software at the IT Department only. There are other workstations and servers available at some of the other departments.

- Two primary nodes—one development and the other production.
- DEC 7620s
- Digital UNIX
- GB memory each
- Approximately 25 GB on each machine
- Development—18 concurrent users
- Production—40 concurrent users
- SDE Server—AlphaServer 2100 4/275

IT Department has four other DEC workstations used for testing and CPU intensive tasks.

Near Future: AlphaServers for Internet applications and distributed data for MapObjects™ and ArcView GIS software use.

11. Describe how the organization deals with, or what role it plays regarding, the diversity of GIS and CAD software, and the linking and coordination of mainframe and legacy systems/data. Describe how the organization deals with interdepartmental rivalry for funding, and so forth.

As mentioned before, the IT Department encourages the user departments to use the ESRI® product line; not only for data format reasons, but also for better resource use—that is, knowledgeable staff to provide technical assistance and the ability to get volume discounts for software. Part of the County's objectives for improving information technology throughout the County is the establishment of standards. This includes the GIS software and data.

A number of methods for using legacy/mainframe data were researched early on. The best way we have found is to extract the most commonly used data into INFO on a weekly basis. For most applications, this frequency is adequate. There are currently no applications with real-time access to mainframe data. There are nightly updates of certain files on the mainframe from data provided from the GIS.

Currently there is access to external RDB and Oracle databases, although limited. The IT Department is trying to set Oracle as the standard for external database management systems.

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King County, Washington

1. Describe the GIS organizational structure and how it is operated.

GIS oversight committee—To provide leadership; promote, plan, direct, and coordinate development and implementation of a County-wide geographic information system.

Capital project subcommittee—To monitor the schedule, budget, and status of the GIS Capital Project; to resolve conflicts in the project scope or schedule in a manner that best serves the business needs of Metropolitan King County; and to report on the progress of the capital project to the GIS oversight committee.

GIS technical subcommittee—To advise the GIS oversight committee on technical matters arising from the development of a geographic information system for Metropolitan King County including the recommendation of standards, the review of data specifications within the capital project, the review of data maintenance agreements, and the review of the technical specifications for the infrastructure developed during the capital project. Recommendations from the GIS Technical Subcommittee will be forwarded to the capital project subcommittee for presentation to the GIS oversight committee.

GIS program manager—Serve as primary contact for all King County departments involved in GISs. Manage the implementation of the King County GIS Technical Resource Center. Establish objectives, develop workplan, and monitor budget for the project, in addition to coordinating the subprojects.

2. How was the organizational structure developed?

The organizational structure was developed about 3.5 years ago. With support from the King County Council, Metropolitan Services coordinated with King County departments to utilize GIS as a business function approach and establish the goals of the King County GIS Technical Resource Center Project that includes data acquisition, data conversion, network construction, hardware and software acquisition, negotiation of maintenance contracts, and related support functions. The King County GIS Technical Resource Center Project was comprised of four subprojects: the establishment of geodetic control, the development of parcel and related data layers, the development of the street network and related data layers, and the acquisition and installation of the infrastructure to make the data accessible to the participating agencies. In addition, the King County GIS Technical Resource Center Project was given direction to build the organizational commitment to maintain and enhance the geographic information created by this project. The officials and organizations participating in the King County GIS Core Project at the time of signing this charter include the King County Council, the King County Assessor, and the departments of Executive Administration; Metropolitan Services; Public

Works; Public Health; Parks, Planning, and Resources; Public Safety; Development and Environmental Services; and the Office of Financial Management.

3. Was there a "Team of Two" (a champion at the policy level and a technical lead) to act as catalyst throughout the organization?

Metropolitan Services and Development and Environmental Services provided the impetus for GIS to spread throughout the County.

4. Where is the GIS organization located within the jurisdiction's structure?

There is an independent group called the Technical Resources Center (TRC) within the Information and Telecommunication Service Division. It has been in existence a little over three years. TRC has migrated from a capital project to Operational Group funded, paid by participating departments.

5. What are the GIS organization's functions?

The Technical Resources Center is a clearinghouse for all County GIS data. It provides capital project and technical leadership for all County GIS activities, provides hardware/software technical support/leadership for all the departments, provides training, evaluates new software/hardware products, does hardware/software maintenance, and provides a core central database for the fourteen departments. This includes maintenance of several data layers including parcels.

6. How are standards developed and enforced?

The Technical Resources Center has developed written standards for system, database, and programming. The Center checks department sites for these standards and enforces them through increasing service costs to departments that do not follow the standards.

7. Where has the organization succeeded in making GIS work?

Departments have been assigned individual coverages to maintain, thus stopping the duplication of coverages. For example, street centerlines were being maintained by several departments and now one does it.

Departments' awareness has increased regarding the need for and utility of standards, thus increasing their compliance with them.

Organization has been responsive to directives from top down to help small departments.

Small departments are provided assistance from introduction-to-GIS level through full-scale GIS deployment.

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8. What have been the problems?

No response.

9. Is there an available diagram of the organizational structure, bylaws, or meeting minutes or other examples of how the organization is run?

No response.

10. Describe the technical environment.

In the Technical Resources Center there is DEC Alpha OSF 3/4, with mostly PCs with X emulation. In the other County departments, there is a mixture of UNIX platforms including Hewlett–Packard and Sun. Up to now, the Center has primarily been a workstation ARC/INFO user environment, but now it is beginning to deal with large numbers of ArcView GIS users (e.g., the Assessor is getting 250 ArcView GIS licenses). The Center is currently evaluating options such as Spatial Database Engine™ (SDE™) to provide easy accessibility to the desktop user.

11. Describe how the organization deals with, or what role it plays regarding, the diversity of GIS and CAD software, and the linking and coordination of mainframe and legacy systems/data. Describe how the organization deals with interdepartmental rivalry for funding, and so forth.

GIS-CAD approach of the Center has been to support DXF-to-ARC/INFO and ARC/INFO-to-DXF conversions, but to try to keep AutoCAD licenses to a minimum. The Center is setting up a standard now for engineers to use in submitting CAD data to the County. All County mainframe databases are/will be migrated to standard Structured Query Language (SQL) client/server environments (Oracle, Informix, Sybase).

LOJIC (City of Louisville and Jefferson County, Kentucky Information Consortium)

1. Describe the GIS organizational structure and how it is operated.

LOJIC has a policy committee (meets every other month), chaired by the executive director of Louisville and Jefferson County Metropolitan Sewer District (MSD). The committee is comprised of top level administrators from each of the LOJIC participants—MSD, Property Valuation Administrator, City of Louisville, Jefferson County, and Louisville Water Company. It is responsible for general oversight and formulation of policies regarding the broad goals of LOJIC; growth and expansion of participant base; approval of special license agreements; funding of special projects, studies, research, and additions to GIS staff; open records policies; and products pricing.

There is an LOJIC technical committee (meets monthly) comprised of fourteen LOJIC users from the following participating agencies:

- MSD Storm Water, Sanitary Planning, Information Services
- PVA Property Mapping
- Planning Commission
- City Public Works
- County Public Works
- Louisville Water Company
- City Information Services
- County Information Services
- City Inspections/Permits/Licenses
- LOJIC Technical Staff

The technical committee serves as a means of fostering interagency communication and cooperation in many areas of LOJIC implementation. The membership provides general technical direction in recommending priority projects and studies, database/application development, resource allocation and the expansion of LOJIC to other user agencies. The technical committee may assemble ad hoc subcommittees for purposes of conducting special studies resulting in reports and recommendations to the technical committee and policy committee. The technical committee has dealt with issues on system integration/expansion, database updates, application development, site addresses, survey control enhancement, development plan review, user training, and products policies.

The LOJIC User Group (meets every other month) is an open forum of all LOJIC users and involves presentations and discussions on system enhancements, software

developments, new data and applications, special projects, technical instruction, and any other issues of importance to LOJIC users.

A twelve-person technical staff for LOJIC, housed in MSD Engineering, and funded through MSD, supports GIS activities in the user agencies. This staff is made up of three teams: database development, applications development, and system management. Through an extensive LOJIC user support program (LUSP), these staff support all user agencies and guide the integration and use of the LOJIC GIS.

2. How was the organizational structure developed?

In 1985, PlanGraphics was commissioned to study the feasibility and cost-effectiveness of a comprehensive GIS for the City of Louisville, Jefferson County, the Metropolitan Sewer District, and the Property Valuation Administrator. A consortium was formed to implement the GIS and to facilitate the participation of other agencies and utilities. There are now twenty-seven agencies among the four major participants including agencies from the City of Louisville, Jefferson County Government, the Property Valuation Administrator, Louisville Water Company, and the Metropolitan Sewer District.

MSD provided the capital and staff for initial LOJIC development—core data, systems, staff, and applications. "Lease/Purchase" agreements have been developed with the City of Louisville, Jefferson County, Louisville Water Company, and PVA, who over a fifteen-year time frame will provide payments to MSD for LOJIC coownership. Annual payment of City and County is $250,000 each. At the fifteen-year end, LOJIC will be co-owned by MSD at 30 percent, PVA at 10 percent, Louisville Water Company at 20 percent, City of Louisville at 20 percent, and Jefferson County at 20 percent.

The Louisville Water Company recently agreed to join the consortium as a full participant. The Louisville Gas and Electric Company has renewed discussions to license LOJIC basemapping. The Consortium is also negotiating limited license agreements with other small municipalities and independent fire protection departments in Jefferson County. Cooperative relationships exist with the University of Louisville for training, internships, and research support. Ongoing discussions with the Louisville Chamber of Commerce and other private sector businesses and data developers guide marketing and product direction.

3. Was there a "Team of Two" (a champion at the policy level and a technical lead) to act as catalyst throughout the organization?

Policy level champion has been the MSD Executive Director Gordon Garner, and technical level champion has been MSD LOJIC Manager Bruce Seigle.

4. Where is the GIS organization located within the jurisdiction's structure?

MSD serves as the project management agency for the Consortium. LOJIC staff are in MSD, which funded the initial implementation of the system at the approval of the MSD Board. While LOJIC staff are housed in MSD, their function is to serve LOJIC participants—to build, maintain, enhance, and support GIS use throughout the Consortium. An LOJIC staff of twelve includes one network administrator, one hardware specialist, six applications developers/GIS analysts, one database coordinator, one technical coordinator, one product specialist, one technician, and one GIS manager.

5. What are the GIS organization's functions?

Provide technical support services, training, standards, policy/procedure guidelines, maintain shared data libraries, encourage users to publish data, and develop metadata standards.

6. How are standards developed and enforced?

They were developed by LOJIC staff. Only metadata standards are enforced for data published by users. LOJIC staff provide guidance and support to users developing their own data.

Metadata and system documentation are now available on-line to all LOJIC users. While not yet totally FGDC compliant, this documentation is patterned after the National Spatial Data Standard, and provides consistent and highly detailed information on the characteristics, sources descriptions, maintenance status, point of contact, and schema dictionaries for each of the 100 published LOJIC GIS databases.

7. Where has the organization succeeded in making GIS work? How has the GIS organization been able to promote GIS in departments or throughout the government?

LOJIC played a major role in changing the Kentucky Open Records Law to allow cost recovery for GIS products and data, based on either the commercial or noncommercial use of the data. LOJIC has recovered over $500,000 in the past four years through the sale of products and services. Policies in place coordinate product distribution and fee schedules among all participant agencies.

Users share a common geographic database of planimetric/topographic features, property, administrative/political boundaries, natural resources, street centerlines, and addresses, eliminating redundant mapping. Individual agencies have maintenance responsibilities for each shared LOJIC database.

Increased cooperation and communication among governmental agencies, especially in the area of network and systems development. Because of the success of the LOJIC Consortium, initiatives have begun over the last eighteen months to develop a joint fiber optic network connecting the agencies of City, County, and State

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government and the office sites of MSD, Louisville Water Company, and many schools within the urban area.

LOJIC is facilitating the development of a joint E-911 system among numerous City, County, and District organizations involved in emergency management. This is being done by providing a common denominator, spatial data—site addresses, specifically—for joint use by all in a shared system.

LOJIC's approach to GIS (as a tool—a technical bridge solution—not imposed from above) and its assumed role as a facilitator, behind the scenes—these have promoted interagency cooperation and view of the benefits of the system for improving job efficiency.

As LOJIC developed and grew in scope and magnitude, staff roles were expanded and redefined to accommodate and promote the growth. MSD has supported the staff position redefinition/role expansion and compensation upgrades needed to: (1) acknowledge professional growth to more complex duties and responsibilities, (2) retain trained/qualified staff, and (3) keep pace with GIS market/industry growth.

GIS appealed first to midrange staff, middle level users. Thus LOJIC recognized and devoted considerable time to demonstrating and promoting the technology to department/division managers. This is finally being realized now as desktop use of GIS has expanded to over 200 ArcView GIS users.

8. What have been the problems?

The complexity of the technology (including ARC/INFO in a UNIX environment), users with little computer experience, the time spent and expense of building the database (two years for planimetric/topographic base, two more years for parcel), the lack of applications once the database was built, and the difficulty in users developing their own applications (caused a backlog of application development work that LOJIC staff has focused on getting through).

More time should have been spent early on in developing the site address component of the system. This is key to users in recognizing the potential functions they might perform with GIS.

Staffing—building and retaining staff among user organizations.

9. Is there an available diagram of the organizational structure, bylaws, or meeting minutes or other examples of how the organization is run?

No response.

10. Describe the technical environment.

- Population Served: 625,000
- Square Miles: 390
- System Environment:

  - Software: ARC/INFO, ArcView GIS, Oracle, SYBASE, HANSEN
  - Hardware: Sun, four servers, 68 workstations, ten X-terminals, 400 PCs

Over the last ten years, the LOJIC system has grown through an initial network configuration based on a Prime central minicomputer to a distributed architecture based on Sun SPARC servers and workstations. There are fifty-four SPARC workstations and several PCs that attach to the network via Hummingbird/eXceed emulation software. LOJIC maintains a 20 GB ARC/INFO LIBRARIAN™ database of County-wide base and thematic mapping and photo imagery, plus redundant ArcStorm™ databases for property and street centerline layers on two primary and two secondary servers connected via a dedicated fiber optic network. T1 lines serve several remote locations. System expansion currently involves some new ARC/INFO workstations, but the user emphasis is shifting to workstation and PC ArcView GIS installations. LOJIC expects to have over 200 ArcView GIS users on the network in the next year.

- Size of Project: 260,000 parcels, 15 GB vector, aerial photo and attribute database, $12,000,000 project cost

- ARC/INFO users = 125
  ArcView GIS users = 200

Specific Applications Presently in Use:

- Infrastructure Management
- Wastewater
- Stormwater
- Water
- Public Access
- Cartographic Production
- Watershed Analysis
- Planning and Zoning
- Land Records Management
- Flood Insurance Determinations
- Board of Elections
- E-911

LOJIC was named the winner of the 1996 Automated Mapping/Facilities Management International Excellence Award.

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11. Describe how the organization deals with, or what role it plays regarding, the diversity of GIS and CAD software, and the linking and coordination of mainframe and legacy systems/data. Describe how the organization deals with interdepartmental rivalry for funding, and so forth.

System and network integration has become a focal priority of LOJIC users and technical staff. This last year, LOJIC successfully established data exchange procedures with the City of Louisville Office of Information Systems and the Property Valuation Administrator's Office. These protocols and procedures result in the nightly or weekly exchange of critical data from mainframe systems to the GIS. In addition, prompted by the sewer facilities conversion project, there now exists a seamless and dynamic connection between LOJIC and the Metropolitan Sewer District's Oracle server, which manages the Hansen Infrastructure Management System, the Industrial Waste Information System, and the TRIMCO Imaging System.

Loudoun County, Virginia

1. Describe the GIS organizational structure and how it is operated.

The GIS/Land Records steering committee is the policy committee for both GIS and Land Records. It is chaired by the county administrator and composed of department heads—Planning, Economic Development, Financial Service, Fire/Rescue, Information Technology, Technical Operations, and Building/Development. The Town of Leesburg is also on the committee.

2. How was the organizational structure developed?

The system is nine years old. It evolved from being within a department to becoming its own department.

3. Was there a "Team of Two" (a champion at the policy level and a technical lead) to act as catalyst throughout the organization?

There is a team of two or three: the county administrator, a deputy administrator, and the GIS manager.

4. Where is the GIS organization located within the jurisdiction's structure?

- Now and for the last four years: Office of Mapping and Geographic Information (OMAGI), under a deputy county administrator.
- Moved from its start in the Natural Resource Department as an environmental planning tool. Required a changed name and focus to County-wide tool.
- Located where it is now because its focus is multidepartmental and public service.

5. What are the GIS organization's functions?

- Policy functions: steering committee has a plan that lays out policy, direction and priorities.
- Technical functions: OMAGI serves as technical advisor to the policy steering committee; prepares work plan and budget based on steering committee direction and priorities.

6. How are standards developed and enforced?

Standards are not addressed in a formal way. OMAGI has its own standards for the data it maintains—basemap, property, centerlines, and addresses. Other departments set their own standards for their data layers, but these are subject to the informal review/approval of their user departments.

7. Where has the organization succeeded in making GIS work?

The steering committee has been instrumental in growing GIS throughout the County. It has provided the committee members (department heads) with a GIS background and understanding of how it could support departmental operations. The department heads then take the steps they need (e.g., justify/secure budget; get staff, software, hardware) to expand GIS in their department for supporting more of its operations.

Completion of a new building, wired with up-to-date communications technology, has been very beneficial also. This allows GIS to be used live at board and other meetings and hearings.

The GIS has been integrated with and is a key component of the County's land records management system. It is linked to the assessment system, providing daily updates of new parcel and address data.

Information sharing agreements with outside entities have also been responsible for GIS growth. The County supplies data at no cost and in return gets information needed from the outside entity which improves County operations.

8. What have been the problems?

The greatest problem in the past was having GIS located within a user department. Now that it is in a neutral position (i.e., its own department under the county administrator) much progress has been made.

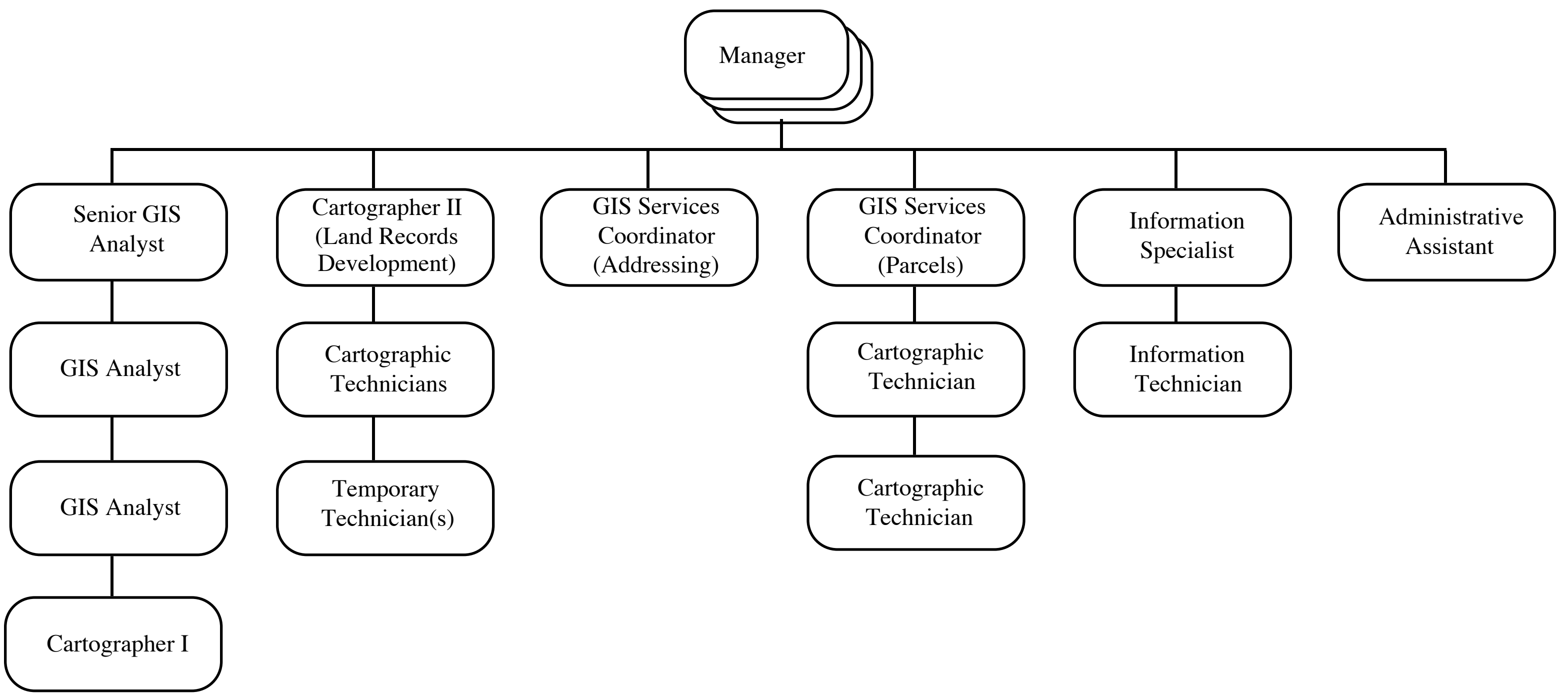
9. Is there an available diagram of the organizational structure, bylaws, or meeting minutes or other examples of how the organization is run?

The committee does not have bylaws. The GIS manager is the committee's staff. (OMAGI's organizational structure information, including meeting minutes, OMAGI structure diagram, plan goals, objectives, priorities, and a hardware configuration diagram, are available and were supplied to ESRI.)

See Figure 3.

Figure 3

Loudoun County Office of Mapping and Geographic Information September 5, 1996



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10. Describe the technical environment.

- Central HP server, thirty-one terminals/PCs with Hummingbird, 6 plotters, 3 digitizing boards
- Population
- Square miles

11. Describe how the organization deals with, or what role it plays regarding, the diversity of GIS and CAD software, and the linking and coordination of mainframe and legacy systems/data. Describe how the organization deals with interdepartmental rivalry for funding, and so forth.

The steering committee directs the linkage of mainframe and legacy systems to GIS, working with an automation committee. It identifies the priorities for linkages and works with the IS technical staff and OMAGI technical staff to set the implementation strategy.

OMAGI is not in competition for funding with other departments. Each department must justify its own budget to the County Board. OMAGI's budget request is justified by the priorities set by the steering committee.

OMAGI also is unique in that it actively solicits GIS partners from outside County government. These become supporters of GIS and the County. They include the Engineering Surveying Institute, realtors, and users of the public GIS counter.

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City of Oakland, California

1. Describe the GIS organizational structure and how it is operated.

The GIS is operated as an enterprisewide project over the entire City organization. It is also inter-enterprise, with agencies outside the City government—fifteen outside members total.

A steering committee is composed of the assistant city manager and agency heads and the project manager to ensure that the City shares data. There is an advisory committee to advise the steering committee. They handle resources and issues across divisions. If the issue cannot be resolved there, it is moved to the steering committee. Financing and policy making occur at the steering committee level.

2. How was the organizational structure developed?

Measure I, a bond for an emergency response system, created the funding. Phased implementation was based on a Measure I bond request for proposal for applications. This is concurrent with other initiatives for basemapping, with sewer and storm capital improvements, and with a street lighting project. With the intent to have a common basemap among all efforts, Measure I provided the funding to automate basemap data at 1:40 scale with resampling at 1:100 and 1:200. The basemap was completed in a two-year time frame with the following content:

- 1:200-scale digital orthophotography of the City on CD
- Cadastral map on CD
- TIGER conflation to digital orthophoto
- Standard addresses
- Census conflation
- A total of 100 layers based on 1:40-scale ground truth

3. Was there a "Team of Two" (a champion at the policy level and a technical lead) to act as catalyst throughout the organization?

Technical champion was Mike Smith. Also, a deputy city manager supported GIS at the policy level.

4. Where is the GIS organization located within the jurisdiction's structure?

The GIS organization is located in the Office of Communication and Information Services, under the administrative agency of the City. Prior to recent City restructuring, the GIS staff reported directly to the city manager. The GIS (Information Systems) manager came from an information technology and large-scale departmental systems background.

5. What are the GIS organization's functions?

GIS was deployed with distributed nodes on local area networks, with ARC, DBMS, SDE, and Oracle. There is a custodian at the node (department) responsible for maintaining specialized information from them depicted on the basemap (which is maintained by the GIS group). This information is posted to a central repository that is controlled by the GIS group. Interagency standards groups address the issues of data sharing and how access is controlled.

6. How are standards developed and enforced?

If the departments do not adhere to standards, they may not use the shared data (free to users). Memorandums of Understanding (MOUs) exist between participants stating that GIS data cannot be distributed or sold.

7. Where has the organization succeeded in making GIS work?

Standard policies exist for how departments can access data. Data are stored on an AS400 in folders, complete with metadata. Recommended tools for custodians to use: ArcView Version 1 until money is available to get ArcView Version 2. Custodians have to get ArcView GIS training, connect to the City's WAN backbone, download data, and so forth.

Administrative instructions are required before using/accessing the data.

Mike Smith's group accepts/rejects data for sharing.

8. What have been the problems?

There has been an organizational capability matrix–paradigm shift. Some people are ready to accept the new paradigm and some are not. A City-enforced mandate for departments to cooperate may have been useful, but may not have succeeded anyway.

Current demand for GIS services outstrips the available staff and resources. There is no technical mandate for funding GIS work City-wide as exists with capital projects. Individual departments must secure funding independently for their GIS.

9. Is there an available diagram of the organizational structure, by-laws, or meeting minutes or other examples of how the organization is run?

No response.

10. Describe the technical environment.

The City's strategy is to support a heterogeneous GIS environment including MapInfo, Atlas GIS, and so forth. They recommend ESRI's ArcView GIS and ARC/INFO tools and that the custodian uses the local area network, has a database server, and that Mike Smith's group maintains the DBMS and network remotely.

The GIS environment has over fifty ArcView GIS users now with 100 licenses on order. June of next year, there will be 100 more ArcView GIS software licenses in the City alone, with more for the interagency users. Currently there are 2,000 to 3,000 hits per day on the Internet.

11. Describe how the organization deals with, or what role it plays regarding, the diversity of GIS and CAD software, and the linking and coordination of mainframe and legacy systems/data. Describe how the organization deals with interdepartmental rivalry for funding, and so forth.

It is recommended that users use the tools they like best, and when data need to be shared they are converted into ARC/INFO coverages or ArcView GIS shapefiles. Standards are encouraged to be used for sharing.

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Prince William County, Virginia

1. Describe the GIS organizational structure and how it is operated.

The GIS group consists of a GIS manager, GIS supervisor, three 3 GIS analysts, one demographic analyst, and seven GIS specialists. The GIS manager provides oversight for all layers within the GIS database and ensures that the latest technology is implemented when appropriate. The GIS manager reports directly to the manager of Information Resources Management. The GIS supervisor manages and distributes daily work assignments and provides quality control for all data added to the corporate database. Demographic and GIS analysts are responsible for the more complicated tasks as well as for applications programming. GIS specialists are responsible for data layer creation and updates based upon specifications provided to them.

2. How was the organizational structure developed?

GIS was originally developed within the Office of Mapping as a department. All GIS projects from other departments were submitted to the Office of Mapping, and GIS functions were centralized. In July 1996, GIS became a group functioning under the Information Resources Management Division of the Office of Technology and Facilities Support Services. At that time GIS activities were decentralized, with individual departments using GIS as a tool for their individual needs.

3. Was there a "Team of Two" (a champion at the policy level and a technical lead) to act as catalyst throughout the organization?

A GIS committee was formed in the early 1980s by the county executive. Mr. Charles McNoldy is the technical champion and is basically responsible for the high-quality GIS existing today.

4. Where is the GIS organization located within the jurisdiction's structure?

It is within the Information Resources Management Division of the Office of Technology and Facilities Support Systems. GIS is funded through the County's general fund, internal service fund, and revenues received from data sales.

5. What are the GIS organization's functions?

The GIS group provides the overall policy for data creation and use. They maintain the core data layers in the corporate database and provide technical assistance to all departments using the GIS.

6. How are standards developed and enforced?

Standards are set by the Information Resources Management Division concerning data sources, data accuracy, and hardware and software implementation. Enforcement is through County policies.

7. Where has the organization succeeded in making GIS work?

The corporate database consists of approximately fifty-two layers of geographic data and a number of applications. (See enclosed.) With the reorganization and decentralization of GIS activities, all departments are encouraged at the top levels to use GIS. Public Works has developed several applications in their Watershed Management Division. Planning is responsible for existing and future land use coverages as well as a zoning layer. Fire and Rescue uses street centerline data for response time analysis and for planning additional services.

8. What have been the problems?

Budget constrictions have limited the expansion of the GIS. It is necessary to compete with other County programs for funding. Technology changes very quickly, and in order to maintain a high-quality database it is necessary to remain abreast with the latest technology.

9. Is there an available diagram of the organizational structure, bylaws, or meeting minutes or other examples of how the organization is run?

See Figure 4.

10. Describe the technical environment.

Data reside on an HP9000 server with a number of HP workstations, X-terminals, and PCs. We are currently using CalComp digitizers, a Xerox electrostatic plotter, CalComp pen plotters, and an HP Model 750C ink-jet plotter.

11. Describe how the organization deals with, or what role it plays regarding, the diversity of GIS and CAD software, and the linking and coordination of mainframe and legacy systems/data. Describe how the organization deals with interdepartmental rivalry for funding, and so forth.

Data are converted without difficulty to DXF format for CAD users. All efforts are made to provide data in a usable format. Policy requires that new users interact with the Information Resources Management Division to ensure that all hardware and software purchases are compatible with existing resources. Funding for hardware and software is provided through the internal services fund. This is a charge-back function to individual departments through the Information Resources Management Division of OTFSS. GIS is a mandate from the county executive, so it plays a major role in the County funding.

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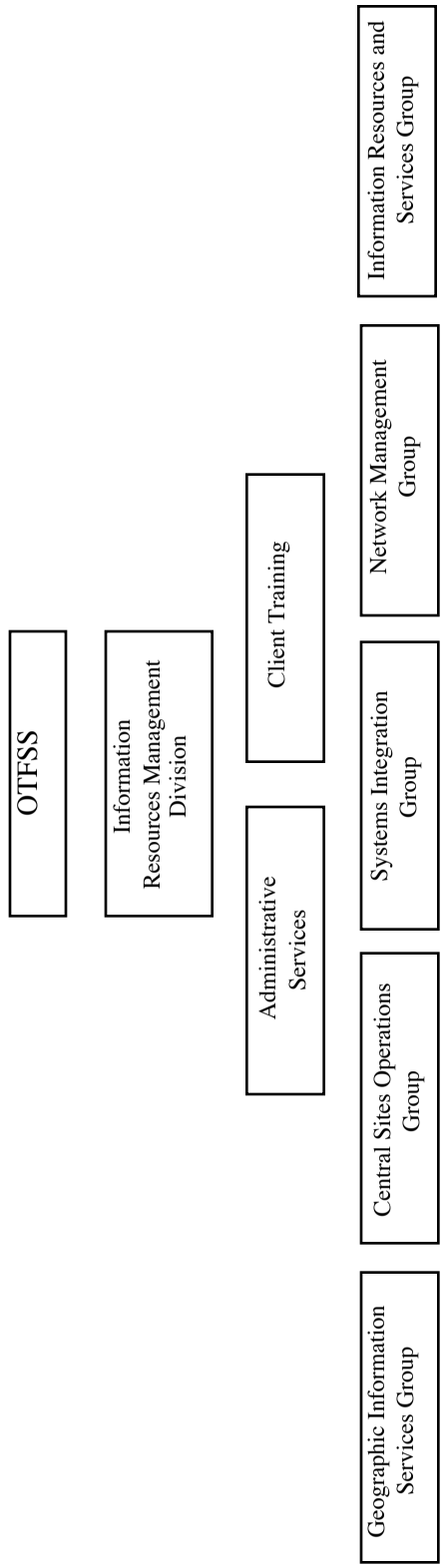
Figure 4
Organizational Chart



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