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Geographic Information System Report for Cameron Parish

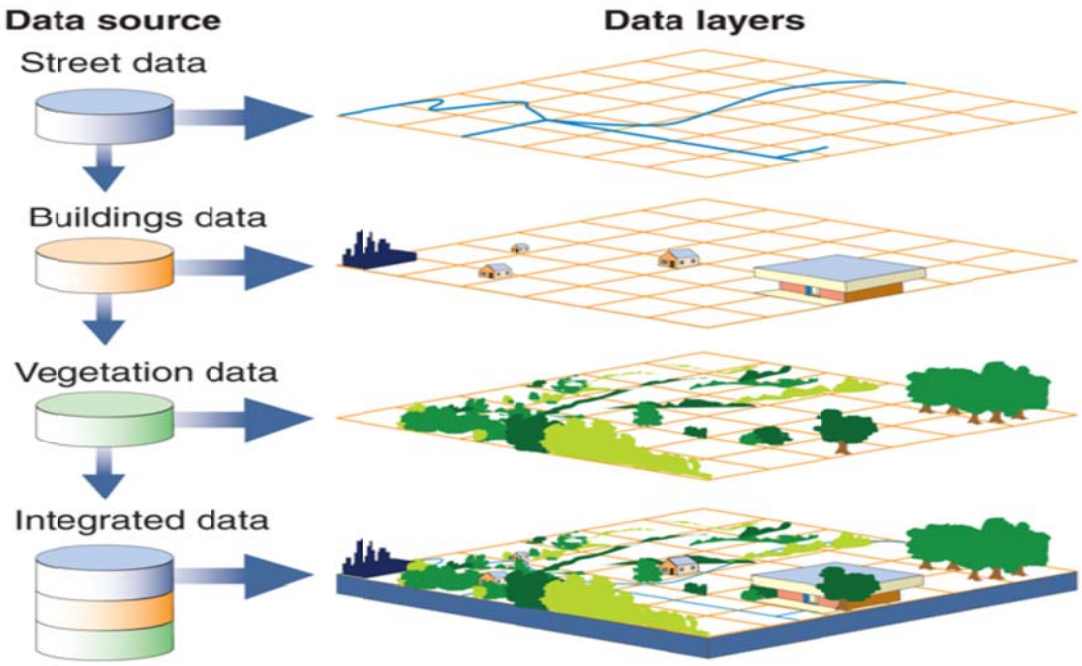
ABSTRACT

This report briefly describes the capabilities and benefits of a Geographic Information System (GIS) for use in different localities. This report will define GIS, describe the system benefits, outline potential GIS emergency management applications, provide general costs to operate a GIS, and the drivers of those costs. It primarily draws on Peter Folger's report for the Congressional Research Service (CRS) (2009), GIS companies such as ESRI and Manifold, and selected reports from different localities.

WHAT IS A GIS

GIS is a computer system "capable of capturing, storing, analyzing, and displaying geographically referenced information" (CRS 2009, 2). This information can be a specific geographic location and can include, "highway intersections, office buildings, rivers, the path of a tornado, or congressional district boundaries" (CRS 2009, 3). GIS is popular with local governments because of its ability to "layer" information, as shown in Figure 1. For example, a GIS can combine "the location of a highway intersection and the average number of vehicles that flow through the intersection throughout the day" (CRS 2009, 2) and the layered information can help policymakers decide possible locations for various businesses or whether the city needs a traffic light. The GIS information is displayed through a database or a visual map. GIS provides fast and easy access to data and system resources, "which continuously contributes to better support and more informed decision making by city staff and city leaders" (ESRI, 1).

Figure 1. Example of GIS Data Layers or Themes



Source: (CRS 2009, 6)

BENEFITS OF A GIS

Based on our preliminary research, a GIS can provide numerous benefits to local governments. Governments have found improvement in customer satisfaction, greater efficiency, and quality assurance.

Greater Customer Satisfaction

Governments can respond to citizens' inquiries by accessing the database and quickly responding. For example, the town of Amherst, Massachusetts, created a self-service mapping kiosk which improved the public's access to maps and geographic data. This service helped to reduce response time to citizen inquiries because citizens would submit an inquiry online and receive an answer in seconds instead of waiting for city workers to find the answer. This freed county workers to devote additional time to other duties (ESRI). Furthermore, Amherst citizens have the ability to research needed information such as trash collection or search for the nearest county facility on their own without asking city workers (ESRI).

Greater Efficiency

A GIS can improve productivity for governments. For example, the city of Portland, Oregon estimates that the city has saved about $9 million reducing "duplication of system, software, staff and other relation cost items" (ESRI, 1) by switching to a GIS. More specifically, city agencies can participate in decision making in a timely manner because shared information is easily accessible to all agencies through a GIS. Furthermore, government workers can access

the data repository, and can work in a streamlined manner which would eliminate the need to update operations.

Quality Assurance

A GIS also can provide quality assurance capabilities. For example, city workers in Philadelphia, Pennsylvania use a GIS to validate addresses for street repair work orders, indexing and searching photos by address, and validating last known addresses for parolees (ESRI, 2). The city's GIS also provides a detailed and accurate map that can be used for planning and designing projects in the city, eliminating the need for field surveys for each project. In a recent survey conducted by the Geospatial Information and Technology Association, the majority of city officials also observed that a GIS database assisted them in quickly finding accurate information pertaining to development decision-making, such as if an area could sustain growth. Residents also did not have to wait for field surveys (Brock 2008).

EMERGENCY RESPONSE

The use of GIS in emergency management functions is vast. For example, there is documented use of GIS after Hurricane Katrina to help first responders find targeted locations (Melikian and Pennington 2006). First responders lacked street signs and landmarks for direction, but a GIS was used to match locations with GPS coordinates to coordinate responders in rescue efforts. Another potential use for GIS is in the emergency planning stage. GIS can be used in simulations to determine what resources will be needed in case of an emergency. According to an emergency manager, Dave Benway who used GIS after Hurricane Katrina; GIS can help, "deploy personnel, assign equipment, organize inventories, evacuate communities, model damage, and identify, repair, and restore infrastructure and crucial services" (2007, 1). In another example, GIS helped the State of California in emergency response to wildfires. Information about active wildfires was posted on an online GIS to give up-to-date information to citizens (CRS 2009). A GIS application could be used during storms and hurricanes to help with evacuation and/or flooding concerns by tracking the depth of rivers and calculating possible threats to infrastructures (CRS 2009).

COSTS OF GIS

The cost of obtaining and operating a GIS system varies greatly depending on the technical skills and desired use by the locality. There are essentially two buying options for GIS (see Table 1). The first option is low cost software that is simple and easy to use but has limited applications. The biggest difference between the low cost and high cost option are applications and capabilities to operate and sustain the GIS. For example, the low cost option does not require advanced technical skills and can be operated by an existing staff member from a desktop computer (GPS & GIS 2009). However, the low cost software has limitations and may only have one data application such as emergency planning. Other applications, such as environmental, hydrology, or property information availability and analysis would not be included (GPS & GIS 2009).

The second option is a higher-cost GIS package that would allow a locality to have expanded use and applications of GIS. This package would have extended applications and also

permit different sectors of government to enter and manipulate data. This option generally requires more technical expertise and a full-time administrator or contractor. In addition, many entities in a geographical area (universities, schools, governments, businesses) within a jurisdiction could share in the GIS capabilities by entering into a data sharing agreement. For example, the town of Amherst, Massachusetts had local universities participate in a shared GIS which helped to reduce overall costs (ESRI, 2). However, there are challenges in sharing a GIS that does require collaboration between the entities that are sharing the GIS capabilities. For example, CRS (2009) observes that it is difficult to organize and manage a large amount of geospatial information with many different entities and share data between entities that may need to use the same or similar data. In addition, there are challenges in determining the software's cost sharing between the uses.

Another consideration of the second option is data collection. According to CRS (2009), acquiring or collecting geospatial data is probably the most expensive portion of GIS and may account for 80 percent of total costs.

Table 1. GIS Option Comparisons

	Low Cost Option	High Cost Option
Capabilities**	basic data entry ability limited/focused applications	maximum data entry ability numerous applications
Costs	$0 - $1,000	$1,500 - $4,000*
Organizational Needs	single jurisdiction internet/desktop software	multi-jurisdiction creation of GIS department
Personnel	part-time employee current employee with novice understanding	full-time administrator contract or new employee with expert understanding
Example of Software	MapWindow (http://www.mapwindow.org/), Streets Ahead (http://www.ospreycomputing.com.au/street_ahead_gis.html)	MapInfo (http://www.pbinsight.com/) ArcMap (http://www.esri.com/)

* Costs can reach over $100,000 with data acquisition
** Both options are capable of making data available to public via internet

Table 1 – Source (GPS & GIS 2009, ESRI).

SUMMARY

There are numerous benefits of a GIS for local governments, but capabilities and costs depend on the specific GIS. Cameron Parish might use a GIS for emergency management,

citizen services, citizen inquiries and field surveys. A more robust system would be accessible for Parish staff and citizens across appropriate functional areas in the Parish. However, such an approach brings with it partnership challenges in cost sharing for original purchase and ongoing implementation, who will have the lead in administering the GIS, and setting priorities for specific application development for individual entities.

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