LAGIC Technical Services Quarterly Report

LAGIC-LSU Contract: 2008-2009

July - September, 2008

October, 2008

Summary:

During the first quarter of the 2008-09 contract, LAGIC and Environmental Systems Research Institute (ESRI™) began development on phase one of a prototype LouisianaMap 2.0 geospatial portal basemap based on the ArcGIS Server v9.3.   LAGIC Technical staff worked with ESRI developers to define the default functionality and capabilities of the Web mapping applications that will be published through the LouisianaMap portal.   A white paper detailing these capabilities was published and made available online (See Appendix for details).

In July, LAGIC Technical Services staff attended the ESRI International User Conference in San Diego, CA. The week-long User Conference offered technical workshops and user paper sessions on numerous topics related to Geographic Information Systems (GIS) and Technology (GIT).

In September, LAGIC Technical Services staff responded to multiple data requests and technical support resulting from hurricanes Gustav and Ike.   *Ad hoc* data requests were received by phone and email immediately leading up to Hurricane Gustav land fall.   Additionally, Chris Pennington, GIS Administrator and developer, volunteered his time for the East Baton Rouge Parish Emergency Operations Center.   LAGIC staff also participated in meetings of the Emergency Data Committee hosted by the LA GIS Council (LGISC).

LSU Computing Services implemented new networking security hardware and policies during this quarter. As a result, LSU internet protocol (IP) addresses were re-addressed for all computers, servers, and printers on the network. LAGIC and LSU Computing Services staff worked to resolve many of the re-addressing issues encountered during this transition.

Finally, various software upgrades were performed during the first quarter. Details of these enhancements and other related technical issues are provided in the following text.

Administrative & Staff:

1) **Staff:**
   LAGIC Technical Services employs one fulltime professional, and one part-time graduate assistant.

   In mid-September, LAGIC met with the leading candidate for the vacant GIS Developer position. The candidate successfully interviewed for the position in May 2008. However, due to the hiring freeze, the candidate took-on a temporary position out of state. With his return, the candidate expressed interest in reapplying for the position. Therefore, the purpose of the meeting was to determine salary requirements and a starting date. The position was re-offered to the candidate, who is expected to make a decision soon.

2) **Training:**
   LAGIC's two full-time technical staff members attended the 2008 ESRI International User Conference held in San Diego, CA. The annual event provides opportunities for technical sessions focused on a full suite of GIS software and extensions.

   Chris Pennington (GIS Administrator) attended a number of instructor-lead courses hosted by LSU. Subjects included the Adobe Web development platform, as well as introductions to JavaScript, XML, and more.

   LAGIC is also utilizing Web-based seminars and other forms of on-line training resources for ArcGIS Desktop, Server, and geodatabases.

   LAGIC technical staff have begun developing in-house user guides and procedural manuals for various software systems and services (*e.g.* ArcSDE, ArcGIS Image Server, *etc.*). These documents will be available to technical staff, and distributed to GIS council members on request.

Data Management & Services:

1) **LAGIC Data Services:**
   Upgrades to the LAGIC geospatial data collections and services were completed in this quarter. These updates included:

   a. *Database System Upgrades:*
      LAGIC geospatial databases were successfully migrated to the new server (\\lagic01). Data is hosted on a SQL Server 2005 Database Management System. Geospatial data are directly accessible via ArcSDE 9.3 spatial database engine.

      LAGIC has also configured a test environment for the open-source PostgreSQL DBMS platform. The software has been installed on a virtual server, and is currently undergoing evaluation as a low-cost and/or *ad hoc* geodatabase server platform.

b. *DBMS Organization:*
   Currently, the LAGIC DBMS consists of six (6) geospatial data services hosting approximately 680 feature class geometries, rasters, and tables:
   i. LAGIC in-house/production database (25 feature classes)
   ii. Louisiana Spatial Data Infrastructure (LSDI) [UTM & GEOG] (254 feature classes, 3 raster datasets, and 39 data tables)
   iii. US Census Bureau TIGER/Line - Second Edition 2006 (42 feature classes, 9 data tables)
   iv. LOSCO Data Catalog (302 Features, 12 tables)
   v. Louisiana Geographic Names Information System (GNIS) (2 feature classes)
   vi. Louisiana Recovery Authority (LRA) - Louisiana Speaks datasets (42 feature classes)

   Ad Hoc databases include:
   i. Homeland Security Infrastructure Program - Freedom (HSIP-Freedom) (132 feature classes)
   ii. Elections Database (3 feature classes)
   iii. Weather Database (18 feature classes)
   iv. TIGER2006 Second Edition - WGS-1984 (42 feature classes)
   v. NAIP 2007 Test Service (2 raster datasets)

   LAGIC's primary spatial data inventory system is maintained within the LSDI schema. The LSDI data structure is hierarchically organized according to *framework data layer category*, *feature name*, *data provider*, and *year of publication*. In order to accommodate various performance enhancement strategies for online publication, it was necessary to organize the data according to both Geographic and UTM coordinate systems.

   All data are securely maintained, and are accessible via policy-based usernames and passwords.

   Data and metadata records receive continuous QA/QC for continuity. Additional changes and edits to the data are made as needed.

   Ad hoc databases are created as needed, and are often the result of a special request or technical project. Due to the nature of their function, some of these systems (*e.g.* HSIP-Freedom) may become permanent database services.

c. *File-based Organization:*
   Data provided on the LAGIC DBMS geospatial database is also available online for broad distribution. Data layers have been exported as ESRI Shapefile format, and include comprehensive metadata.   These assets have been compressed to ZIP format, and are accessible for download from the LAGIC web site data catalog(s): http://lagic.lsu.edu/geodata/.

   In accordance to contracted deliverables, a catalog detailing the LAGIC geospatial data assets has been published online : *The 2008 Louisiana Spatial Data Index (LSDX)*.

d. *Miscellaneous Data Services:*

With technical issues resolved, approximately 65% of LAGIC maintained metadata has been harvested and are currently accessible via Geospatial One-Stop (GOS) Federal data catalog. Additional metadata records will be harvested in the coming months.

LAGIC Technical staff continues to examine ways in which to optimize the 2007 NAIP aerial photography (1-meter, true-color photography) acquired from the US Dept. of Agriculture. During this first quarter, LAGIC acquire all of the un-compressed GeoTIFF images for the 2007 NAIP imagery. LAGIC is currently evaluating several hosting environments for NAIP 2007 image services. Details will be forthcoming.

2) **LouisianaMap Data Services:**
LAGIC data assets have been replicated and transferred to the LouisianaMap data server(s) maintained by the Division of Administration, Office of Electronic Services (OES). Additional details are provided in the Technical Support and Applications Development section.

a. *DBMS Organization:*
Organization of the LouisianaMap data servers mimic those created at LAGIC (see above).

b. *Data Maintenance:*
To accommodate additional datasets (*e.g.* 2007 NAIP imagery, HSIP-Freedom, etc.) LAGIC requested increased storage space on the storage area network. A 800GB LUN was assigned to the \\1SPGISSDE server.

c. *Data Replication Services:*
Interest has been expressed to extend the LouisianaMap data services capabilities to members of the LGISC and Louisiana geospatial community. This has prompted LAGIC Technical staff to explore data replication strategies that can be utilized across heterogeneous networks and the Internet. As time permits, capabilities testing will be incorporated within the LouisianaMap services program (see below).

Technical Support and Applications Development:

1) **LouisianaMap:**
LAGIC is currently developing two technical white papers for LouisianaMap 2.0. The first document identifies the programmatic goals of the geospatial portal within the context of the allocated information services (IS) and technology (IT) infrastructure. Accordingly, the document establishes the business, technical, and hardware requirements necessary to implement the portal. The second white paper examines the LouisianaMap user interface (UI) from a technical requirements perspective. These white papers will be made available in the coming months.

Through a contract with LSU/LAGIC and ESRI, phase-one development on the core functionality of LouisianaMap application services began in late September.

a) *Data Services*:

Various data sets have been successfully uploaded to the LouisianaMap Spatial Data server. To date, this data includes US Census Bureau's TIGER/Line 2006, LSDI, LOSCO, and other data products are .   Additional data layers will be added as needed.

Data services will be accessible via the LouisianaMap portal infrastructure. Limited testing on the robustness of these services are planned in the next quarter.

b) *Applications Development*:
Development of LouisianaMap 2.0 application services has been the primary focus for the last three quarters. A number of key map applications and services have been developed, including:

  i. LouisianaMap 2.0 Base Map: Base-map of Louisiana constructed using U.S. Census Bureau's TIGER/Line 2006 Second Edition data layers. Map services are cached to 9 scale factors, resulting in highly-responsive, interactive mapping. Services include basic map manipulation functionality, including zoom in/out, and pan. Advanced functionality requiring advanced programming is currently being developed by ESRI developers (e.g. printing, geocoding/address matching).
  ii. Explore Louisiana 2.0 (BETA): Map application utilizing the LouisianaMap 2.0 base map. In addition to the functionality identified above, the mapping application includes an identify tool that can be used to reveal attribute details regarding user-selected parishes.
  iii. LOSCO Boat Launch & Lift Locator: Map application that reveals the location and details of publically-accessible boat launches throughout south Louisiana. Boat launch data was provided and maintained by the Louisiana Oil Spill Coordinator's Office (LOSCO).
  iv. Population Explorer: Map application utilizing the LouisianaMap 2.0 base map and demographic data for 2000-2007. Users can click on a parish to review the population changes.
  v. Elections Mapper: Map application utilizing the LouisianaMap 2.0 base map and election results provided by the Louisiana Secretary of State office.

The map applications and services presented above will be accessible via the LouisianaMap Web site: http://map.la.gov/. In addition to the web-based interface, users can access these data services via ArcGIS compliant platforms, including ArcGIS ArcMap, ArcCatalog, ArcGIS Explorer, and Google Earth (limited availability).

Note: these services are beta, and are under constant revision.

The enhancements discussed are currently being developed as part of a technical-services contract with ESRI. LSU/LAGIC and ESRI negotiated a services and support contract for the LouisianaMap 2.0 portal. Details of this contract are provided in Appendix B. Phase-one includes the development of basic functionality (*e.g.* geocoding, printing, bookmark, *etc.*) and a collection of advanced geospatial tools (*e.g.* identify, buffer, select, *etc.*). A second series of enhancements are currently in the planning phase.

Additionally, OES, LAGIC, and Methods Solution will soon begin developing a geocoding service that will allow users to dynamically geo-reference and map non-spatially enabled datasets.   A number of translation strategies have been explored, including a Geographic Markup Language (GML) based service that *geo-tags* XML based data.   Following a requirements analysis, a working prototype was developed and tested during Q4 of FY2007-08. In general, the service functions by parsing each data record in order to identify geographic references stored within the data fields (*e.g.* city, town, address, *etc.*). These references are assigned a geographic coordinate to the record according to the GML open-source standards. For this initial test, reference data was limited to the USGS GNIS database for Louisiana. Future reference database are planned.   The preliminary service has demonstrated the validity of this geocoding approach. Modifications to the service are anticipated over the coming months that will address limitations to the existing service model.

b) *Data Replication & Distributed Data Services:*
As indicated earlier, various LGISC members have expressed interest in extending data services to the GIS Council and Louisiana geospatial data community as a whole. The scope of these services have not been defined, and technical challenges relating to the replication and exchange of data across heterogeneous networks will need to be examined. Additional information will be compiled as time permits.

2) Custom Services
a) *Image Services:*
As mentioned earlier, LAGIC Technical staff have been experimenting with ESRI Image Server as a means for quickly distributing raster data to users.   Initial tests at LAGIC suggest that there is a measurable performance increase when using the ArcGIS Image Server software.   A test services is expected to be available online in Fall 2008.

b) *Globe Services:*
In addition to the services listed above, LAGIC has begun to prepare globe services that present historic maps obtained from the US Library of Congress. These map services will utilize ArcGIS Explorer, Google Earth, and NASA World Wind globe/visualization software (when possible). Globe services will be available on the LouisianaMap 2.0 web site.

c) *Ad Hoc Services:*
The success of the map and data services provided during the 2007 hurricane season has prompted a number of inquiries about similar resources during the 2008 hurricane season. LAGIC will entertain these requests as time and resources permit.

3) LAGIC Technical Services
a) *ArcGIS Server User Group*
LAGIC Technical Services has coordinated a first meeting of an ArcGIS Server developer's support group.   LAGIC is coordinating this effort with various members of the GIS Council (currently LDOTD, LDEQ, and Lincoln Parish) and other interested parties. The first meeting coincided with the 2008 Louisiana Remote Sensing & GIS Workshop, held April 8-10, 2008.

Approximately 30 people attended the meeting, which included guest speakers from ESRI San Antonio regional office.

Currently, the User Group has an online presence hosted by Google Groups. The site supports a closed-membership of approximately 30 accounts.   Members are permitted to contribute to the group, asking questions, sharing code, and promoting projects.

b) *Ad Hoc Support: Hurricanes Gustav and Ike*
LAGIC Technical services staff have participated in and responded to various emergency response requests issued during Gustav and Ike. I addition to coordinating various data requests, LAGIC prepared two geospatial processing (*e.g.* GIS and Remote Sensing) workstations and a data server to support incoming data needs.

During this period, Joshua Kent responded to numerous geo-data requests from the Louisiana State University Emergency Operation Center. Additionally, Chris Pennington volunteered his time in response to a request issued by the East Baton Rouge Parish Emergency Operation Center for technical support and analysis.

LAGIC Technical Support Services:

1) **System Support - LAGIC**
   a) *Systems Administration:*
       LAGIC technical staff continues to maintain geospatial data systems and services (see above).

       As per recommendations following the annual technology inventory, a number of hardware upgrades were purchased and deployed during this quarter. Hardware acquisitions include:

       i.   Two Dell Precision Workstations were purchased for data and image processing.
       ii. One Dell PowerEdge Server to upgrade the SQL Server DBMS
       iii. One Dell Optiplex managed desktop to upgrade Craig Johnson's 5-year old desktop.
       iv. Miscellaneous hardware purchases included external and internal hard disk drives, RAM upgrades, and ad hoc hardware repair.

       Where ever possible, all outdated computer/hardware are upgraded, re-assigned, or scavenged for parts. Scrap is collected by LSU property management.

   b) *Networking:*
       In August, LSU *Information Technology - Network Infrastructure* implemented a mandatory, campus-wide network re-addressing strategy for all network-accessible hardware. The migration to the new V-LAN system supports security enhancements applied to all units within the University. These enhancements a part of the *Network 2010* project to enhance the LSU networking infrastructures. The recent upgrades support a robust firewall, 10 Gbps transfer rates for I2 and LambdaRail, secure router infrastructure, and other network topology enhancements. LAGIC technical staff worked closely with LSU ITS-NI to reconfigure server, desktop, and printer IP configurations.

2) **Technical Support -LAGIC**
   a) *Ad Hoc Service & Support:*
      LAGIC technical staff members continue to support all LAGIC related IT issues and requests, and troubleshooting. These include, but are not limited to, technical training, systems preparation, network management, and systems management.

3) **Support - LGISC**
   a) *Ad Hoc Administrative Support:*
      i. Participation in LAGIC Oversight meetings.
      ii. Technical staff continues to respond to miscellaneous technical request and support from both the GIS Council and LSU GIS Community.

Short-term Outlook:

Anticipating new Technical support staff by the end of the second quarter of the FY2008-09 contract. The addition of skilled staff will help meet long-term goals for LAGICs technical development needs, including the successful implementation of the LouisianaMap 2.0 application and data services.

Phase-one of applications development for LouisianaMap 2.0 will concluded by the middle of the second quarter of FY2008-09. Phase-two development is planned for the 3rd quarter.   The DRAFTS of two technical white papers detailing the LouisianaMap services and capabilities will be published by December 2008.

LSU ITS has announced changes to the LSU Active Directory, including a campus-wide upgrade to Windows 2008 Server.   These changes will accompany upgraded group policy settings that are expected to cause short-term impact on LAGIC operations.

APPENDIX A: LouisianaMap Technical White Paper - User Interface (DRAFT)

A DRAFT technical white paper detailing the proposed user interface (UI) for the LouisianaMap 2.0 web mapping applications portal is presented here.

Online access to this white paper is available:
http://lagic.lsu.edu/lagic/whitepapers/2008/lagic-wp-200809_lamap_gui.pdf

A sample of the LouisianaMap 2.0 UI is provided below:
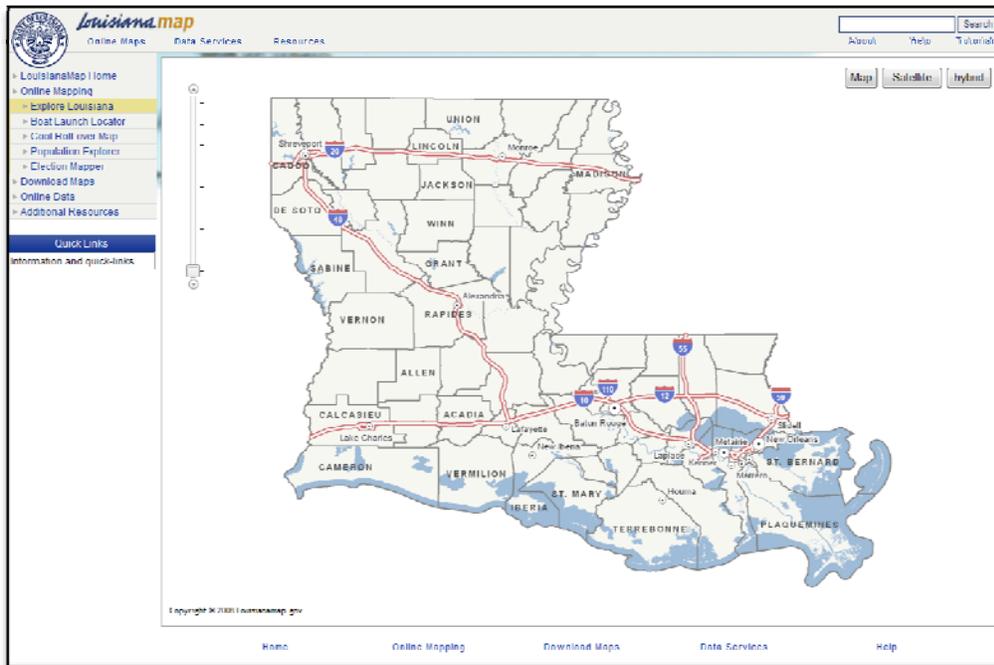
APPENDIX B: LAGIC-ESRI Contract Scope of Services & Scope of Effort

This contract has been executed between LAGIC/Louisiana State University and ESRI.

SCOPE OF SERVICES

1. Scope of Work (Describe the work the contractor will perform, description of the reports or other deliverables to be received, and a schedule of dates when reports or other deliverables are to be received. If applicable, reference attachment.):

> *ESRI has been asked to provide technical support for the implementation of LouisianaMap 2.0. The primary goal of the ESRI support would be to work with Louisiana Geographic Information Center staff to develop a prototype of the LouisianaMap 2.0 based on ArcGIS Server 9.3. ESRI will provide support for the following three activities: LouisianaMap 2.0 Technical Review, ArcGIS Server 9.3 Prototype, and Prototype Demonstration. This activity provides up to 40 hours of consulting, including travel and preparation time to support the technical review of the LouisianaMap 2.0 web application. The LouisianaMap 2.0 is currently in development by LAGIC staff. The LAGIC has requested consulting time for an ESRI ArcGIS Server developer to review the application to provide recommendations on the application. During this activity, ArcGIS Server 9.3 will be discussed to determine the functionality that is forth coming in the next release. It is anticipated that one ESRI Senior Technical Designer will support this activity.*

2. Goals (Include broad, general statement of long-range end result of the project.):

> *The primary goal of the ESRI support will be to work with Louisiana Geographic Information Center staff to develop a prototype of the LouisianaMap 2.0 based on ArcGIS Server 9.3. LouisianaMAP.gov serves as the geospatial portal for Louisiana State government. LouisianaMap 2.0 will utilize the ESRI ArcGIS Server to provide map services to the general public and state agencies. The mission of the LouisianaMap is to provide a central location where Louisiana citizens, agents, and contractors can browse live maps, access geospatial data and services, and geospatially extend existing business data.*

3. Objectives (Should be specific, measurable, aggressive but attainable, result-oriented & time-bound target(s) for accomplishment):

> *ESRI will provide support to complete the following three objectives: LouisianaMap 2.0 Technical Review, ArcGIS Server 9.3 Prototype, and Prototype Demonstration. Once the Prototype Application from the previous task has been developed, ESRI will present and review the functionality and interface of the Prototype Application with LAGIC staff over the course of two days at LAGIC facilities. ESRI will review for compliance with the LouisianaMap 2.0 objectives discussed in Activity 1 and solicit user feedback. comments and recommendations will be documented.*

4. Performance Indicators (Indicate how the performance of each objective is to be measured):

> *ESRI will provide the support necessary to have a functional LouisianaMap 2.0 site on the web, an ArcGIS Server 9.3 Prototype deployed, and a demonstration of the capabilities of these web services*

5. Monitoring Plan (Describe how you will evaluate and monitor program performance):

> *Program performance will be measured by the ability of the websites to meet our performance expectations as determined by live testing.*

6. Name and title of the individuals responsible for monitoring the contract and approving all payments in connection with the contract:

> E-mail address: ***Joshua*** *Kent jkent4@lsu.edu and Craig Johnson cjohnson@lsu.edu*

SCOPE OF EFFORT

Introduction

> LouisianaMAP.gov serves as the geospatial portal for Louisiana State government. LouisianaMap 2.0 will utilize the ESRI ArcGIS Server .Net Framework to provide map services to the general public and state agencies. The mission of the LouisianaMap is to provide a central location where Louisiana citizens, agents, and contractors can browse live maps, access geospatial data and services, and geospatially extend existing business data. The primary goal of this contract would be to work with Louisiana Geographic Information Center staff to develop a prototype of the LouisianaMap 2.0 based on ArcGIS Server 9.3. ESRI will provide support for the following three activities: LouisianaMap 2.0

technical review, ArcGIS Server 9.3 prototype, and Prototype Demonstration. Following completion of this scope of work and the prototype presentation, ESRI will work with LAGIC to define the next steps and additional areas of support which may include enhancements, finalization and deployment of the application on the ArcGIS Server 9.3 platform. This future work may include the conversion of the existing the LouisianaMap 2.0 to ArcGIS Server 9.3. Future work will be separately contracted.

Activity 1 – Technical Review of Existing LouisianaMap application
Duration: Four (4) Days Location: LA Geographic Information Center, Baton Rouge, La.
This activity provides up to 40 hours of consulting, including travel and preparation time to support the technical review of the LouisianaMap 2.0 web application. The LouisianaMap 2.0 is currently in development by LAGIC staff. The LAGIC has requested consulting time for an ESRI ArcGIS Server developer to review the application to provide recommendations on the application. During this activity, ArcGIS Server 9.3 will be discussed to determine the functionality that is forth coming in the next release. It is anticipated that one ESRI Senior Technical Designer will support this activity.

LAGIC Responsibilities:
Provide background and objectives of the LouisianaMap 2.0 application.
Provide access to the LouisianaMap 2.0 viewer code.

ESRI Responsibilities:
 Provide up to 40 hours of consulting support.

Activity 2 – ArcGIS Server 9.3 Prototype
Duration: Seven (7) Days Location: ESRI San Antonio Office
This activity provides up to 60 hours of consulting time at the ESRI San Antonio Regional Office to support the development of an ArcGIS 9.3 Server prototype application. The objective of the prototype application is to demonstrate the capabilities and performance of the ArcGIS JavaScript API for use in support of the LouisianaMap 2.0 application. This prototype will be designed for use by the non-GIS oriented general public in the State of Louisiana and will utilize data being served by the LAGIC. It is anticipated that one ESRI Senior Technical Designer will support this activity.

LAGIC Responsibilities:
Provide background and objectives of the LouisianaMap 2.0 public application.

ESRI Responsibilities:
Provide up to 60 hours of consulting support.

Activity 3 – Prototype Application Demonstration
Duration: Two (2) Days Location: LA Geographic Information Center, Baton Rouge, La.
Once the prototype from the previous task is complete, ESRI will present and review the functionality and interface of the prototype application with LAGIC staff over the course of two days at LAGIC facilities. ESRI will review for compliance with the Functional Specifications and solicit user feedback. Comments and recommendations will be documented and if desired, ESRI can generate an additional proposal for incorporating those items into the prototype. It is anticipated that one ESRI Senior Technical Designer will support this activity.

LAGIC Responsibilities
Participate in Prototype Application and provide feedback and comments.

ESRI Responsibilities
Provide one day prototype application presentation.
Provide technical memorandum documenting LAGIC comments and feedback on the application.