Rice University's GIS/Data Center: How do we do GIS?

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Abstract. The distribution of GIS services in academic libraries has taken many forms; where as some libraries opt to provide a full array of GIS services, others offer mainly on-line reference material. This paper will describe our experience in implementing GIS from a central library location. We would attempt to answer the question of whether we are the trend or the exception in the way GIS services are rendered.

Keywords: GIS Services, Libraries, Academia, Higher Education, Research

Introduction

The Rice University GIS/Data Center was established in 1998 to provide library patrons with access to GIS software and supporting hardware, to data resources, and to print and digital map resources. Support from management coupled with strong and dedicated GIS professionals has made it possible for the center to establish itself as a pioneer within the Houston region for both its unique approach to servicing patrons and its strong emphasis on research.

This paper will serve as the first part of a comprehensive service assessment that we hope to complete before the end of 2006. The initial step of our assessment is to identify how we do GIS by looking at our history and our current service systems, and compare these to the way other libraries offer GIS support.

As the center is approaching the 10th year of establishment it is important to start studying its impact in the Rice community and search for ways to improve the contributions to Rice. However, in this paper we will only serve to answer a basic question –**How do we do GIS?** The center has come far and done so much, but how do we provide our services? Also, how well do we provide services compared to other libraries around the country? Are we the trend or the exception in advancing our services? Different aspects of our work define how we do GIS - our **history**, **services**, and **customers** all help define our comprehensive service scheme.

Our History

A few things needed to happen before our center became a reality. In 1995, the engineering school first identified the need for GIS education and started offering an Introduction to GIS

class with a lab of six IBM/RISC 6000 computers and ArcView/ArcInfo software. In 1997, the engineering school also proposed the creation of a GIS training facility to help students incorporate GIS into their Masters or Ph.D. research. A facility was created but later ceased to exist when the professor teaching GIS left Rice.

Also in 1997, our map librarian got involved in the Association of Research Libraries' Geographic Information System Literacy Project, which provided training for librarians and exposed them to the possibilities of GIS as a library resource. After being trained in GIS, she presented to management the idea of a GIS center within the library, specifically within the Government Publications and Microforms Department. Since university departments were already familiar with GIS, particularly through the engineering school's teaching and training initiative, it made sense to support the library as a central support entity. The combination of GIS awareness within the university, the extra impulse given by the GIS Literacy Project, and adequate funding made it possible for the library to seize the opportunity to create what is now the GIS/Data Center.

Our Services

The center provides various types of GIS services that include short courses, custom-made workshops, one-on-one instruction, and research. The most important medium for marketing our services is our website.

The short courses offered at the center are Introduction to GIS, Editing in GIS, Census 2000, Harris County GIS, Introduction to GPS, and Remote Sensing. These short courses are one-time 1-2hr classes at the introductory level.

Data services offered involve access to regional and world data from the local network and from CDs, help with searching data on-line, creation of data for patron, and data analysis.

Research services generally start with an initial consultation, then basic training, followed by hands-on data processing, analysis and data mapping. The amount of time dedicated to each patron varies greatly depending on the project at hand. Basic questions or short and simple homework assignments require the least amount of time (1-2hrs), but research assistance can take up to weeks and months of one-on-one collaboration between staff members and patrons. Long-term projects have at least one student assistant hired by the professor or department doing research, with the center acting as the on-going support entity and place of employment for the student. In some projects the center is directly involved in the hiring and monitoring of student hours.

Our Customers

The unique needs of the Rice campus are reflected in our customers. The social sciences, earth sciences, and engineering departments were the pioneers of GIS activities at Rice, but others such as history and anthropology have since joined. Over the years the GIS/Data center has been trying to balance support for the different departments within the university by incorporating GIS lectures and assignments in classes and by providing on-going research support in an array of topics ranging from voting behavior to traffic flow, and from history tracking to soil analysis. After the GIS/Data Center was established in the library most of the initial need for GIS was

identified in the social sciences department, and as resources have expanded we have moved to support the rest of the departments with emphasis on earth sciences, architecture, and history. Other departments that have been latecomers in GIS awareness are anthropology, linguistics and business. In the year 2005 the greatest amount of research was done in political sciences and history resulting in international publications and presentations. Also in 2005 the center provided support to approximately 500 patrons within the university walls, and hundreds more through a GIS mentors program and training given to library associations and high school teachers.

In short, our patrons come from many departments, as indicated in this summary of the make up of our patron body (percentage are approximations).

Percentage of Total Center's Patrons	**Department**	**Most Common Service**
30%	Architecture	On-on-one instruction, short-term project guidance and one-time data access
20%	Social Sciences	Extensive initial training and project guidance, long-term research projects
20%	History	Extensive project guidance, long-term research projects, staff part of research team
15%	Earth Sciences	Training of classes in GIS, assistance in thesis work
15%	Anthropology, Linguistics, Business	Small projects

Are we the exception or the trend?

In order to understand how our center has been keeping up with the trends of GIS within libraries we first looked at two surveys done by the Association of Research Libraries (ARL). The SPEC Survey and Call for Documentation on the ARL GIS Literacy Project sent out to ARL members in March of 1997 provided an initial look at how libraries responded to the introduction of GIS services within libraries. A second survey called Spatial Data Collections and Services published in December 2005 tried to shed some light on the current state of GIS services years after the GIS Literacy Project. Both surveys provided a good understanding on how other libraries offer GIS services. However, for this paper we decided to do our own research and visited one hundred library websites to search for answers to our own questions.

The data collected for this research was entirely taken from academic library websites within the United States and Canada, most of whom are Environmental Systems Research Institute's (ESRI) customers. Please note that no phone calls or detailed surveys were sent to the entities administering these website. Furthermore, GIS operations that seemed to be established outside the library in geology, earth sciences, or other labs were not incorporated into the results. The

web sites had to meet two conditions – be part of a four-year university, and be part of that university's library system.

The survey was conducted in a spreadsheet form consisting of a list of seven questions:

1. Does the library appear to have a GIS center?
   Possible Answers:Yes, No
2. List of services being offered
   Answers varied, reported as a summary
3. How many employees are listed as GIS contacts?
   Possible Answers: 3+, 2, 1, no info
4. What are the hours of operation?
   Possible Answers: M-F, M-F+Weekends, no info
5. How many computers are available for GIS work?
   Possible Answers: 1-2, 3+, no info
6. What software is available?
   Possible Answers: a. GIS, b. a+Graphics, c. b+CAD, d. c+Statistics, e. no info
7. Are there mainly on-line resources in that particular library?
   Possible Answers: Yes, No

A GIS center was defined as a dedicated physical space within the library that is used to administer spatial data services. Reassurance that there was an actual GIS center within a library came from common GIS unit descriptions such as center for geospatial data, maps and geospatial information center, or GIS lab. In interpreting the following results keep in mind that number of libraries is also a percentage since a total of one hundred sites were visited.

Question 1.
Does the library appear to have a GIS center? *Possible Answers:Yes, No*

Our survey tells us that we are among the majority of libraries that offer GIS services within a center or lab environment. Sixty-nine percent (69%) of the sites visited appeared to have GIS centers with only 31% percent without centers (Fig. 1). Compared to ARL's Spatial Data Collections and Services survey only 27%of the 72 respondents appeared to have a designated GIS lab [1]. However, not having a center did not mean that those libraries did not offer GIS services; all of the libraries visited with the exception of one in fact had some information about GIS on their websites.

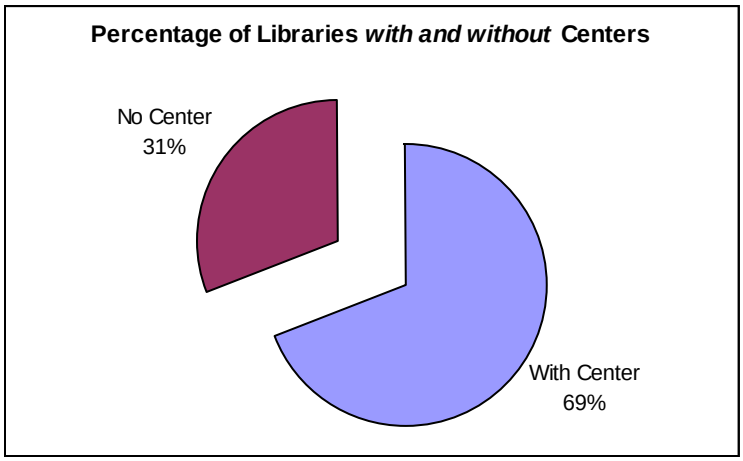

Fig. 1. Percentage of Libraries with and without GIS centers/labs

Question 2.
List of services being offered

From the survey results, we could categorize GIS services offered at libraries into data, instruction, assistance, and other/specializations. The list of services was long in most websites, but some similarities among services were clearly visible.

The data services category consists of services related to making mapping data more accessible in various forms. At libraries data distribution is currently done via on-line catalogs, CDs, data servers, and repositories for both hard copy and electronic data, with some libraries having only on-line access and others acting as the repository for regional information.

Instruction services encompass everything from on-line instruction and occasional classes to customized training and workshops. Not all libraries offered training at their facilities and some provided mainly on-line training manuals. However, the vast majority of the libraries researched did not have on-line training materials, and this was the case even if there was not a GIS lab available.

The assistance category is everything that involves one-on-one interaction between the patron and the GIS assisting personnel. There were big gaps in the type and amount of assistance offered by libraries. Some were self-service with no personal assistance being offered, while others had help available by appointment or only on certain days. Type of assistance ranged from reference services and common GIS services (data manipulation, analysis, etc.) to project planning and development.

The other/specialization category contains all of those services that are unique to certain libraries. Some libraries are highly specialized in training, research or in providing the lab space for one particular department, and others act as the data clearinghouse for their state.

Our center is well represented in all four categories since more than half of the services (underlined items, Fig. 2) listed under each category are available.

Data	Instruction
1. Catalogs 2. Listings of GIS books 3. Hard copy maps & atlases 4. Access to data servers 5. Tools and data 6. Data acquisition 7. Data distribution 8. Statistics data 9. Collection of maps 10. Data on CD 11. Data on workstations 12. On-line access only 13. Regional repository for regional info 14. Maintains digital mapping projects	1. Customized training 2. Occasional classes 3. Links to on-line tutorials & resources 4. Workshops 5. Seminars 6. Orientations 7. Consultations 8. Outreach instruction 9. On-line instruction services
Other/Specializations	**Assistance**
1. Plotting services 2. GPS help 3. Disseminating resources 4. Quantitative research 5. Provide scientifically based DSS 6. Provide lab environment 7. Support for GIS courses 8. GIS data clearinghouse for state 9. Research and teaching focused 10. Used for geography courses only 11. Hard copy maps 12. Teaching 13. Research 14. Used for certain university courses or departments 15. Separate facilities for data and viewing, vs. research and analysis	1. Data extraction 2. Data manipulation 3. Data analysis 4. Locating data 5. Selecting data 6. Cartographic Services 7. Project planning and development 8. Technical support to GIS projects 9. Research 10. Collaboration with faculty and staff 11. Librarian assistance 12. Reference services 13. No personal assistance 14. Self-service, open to public 15. Limited to students, faculty, staff 16. Limited assistance

Fig. 2. Summary of services divided into four main categories identified from survey

Question 3.
How many employees are listed as GIS contacts? *Possible Answers: 3+, 2, 1, no info*

Almost 80% percent of the libraries researched had between 1 and 3+ contacts listed as GIS servicing employees (Fig. 3a). Most had very descriptive titles that indicated that there was a GIS analyst or a map librarian available to answer questions or help do GIS. However, if we

divide the sites into those with and without centers we can see that those libraries with centers had more contacts listed than those without centers (Fig. 3b). Our center is among the 10% percent of centers with two contacts/employees listed and among 80% percent of libraries with 1-3+ GIS servicing employees.

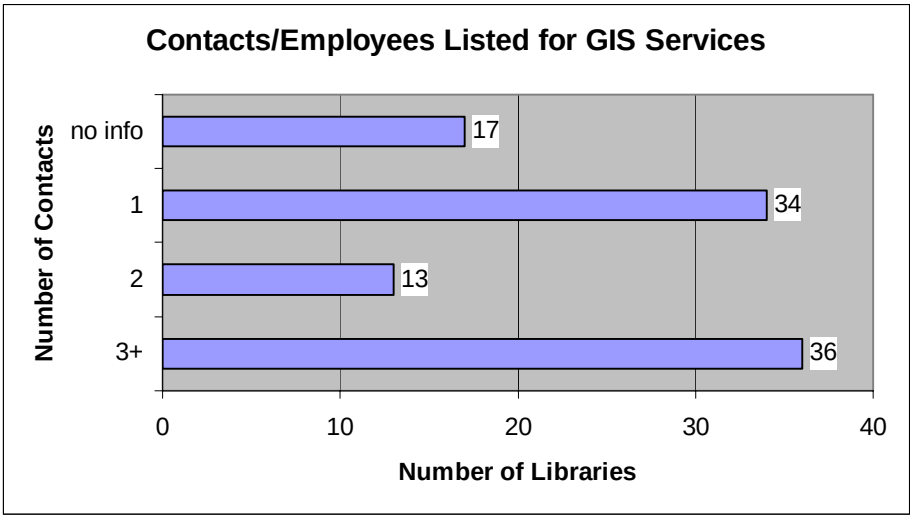

Fig. 3a. Number of contacts or employees listed as available for GIS services

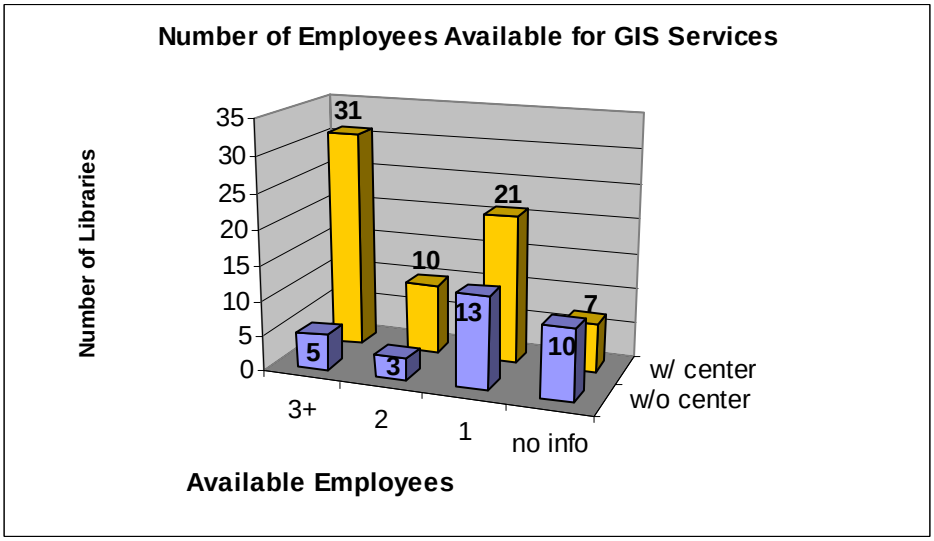

Fig. 3b. Number of employees available for GIS services divided into libraries with and without centers

Question 4.

What are the hours of operation? *Answers: M-F, M-F+Weekends, no info*

Typical hours of operation for GIS service generally followed those of the library extending well into the weekend. Thirty-seven percent (28+9, Fig. 4) of libraries offered GIS services Monday through Friday, with an additional 31% percent extending their services through the weekend. Centers that listed limited assistance during weekdays either by appointment or as available were

counted as M-F "respondents". It was surprising to see that 32% percent of libraries did not have hours listed even if a center was available. Our center is among 37% percent of libraries that offer services Monday through Friday.

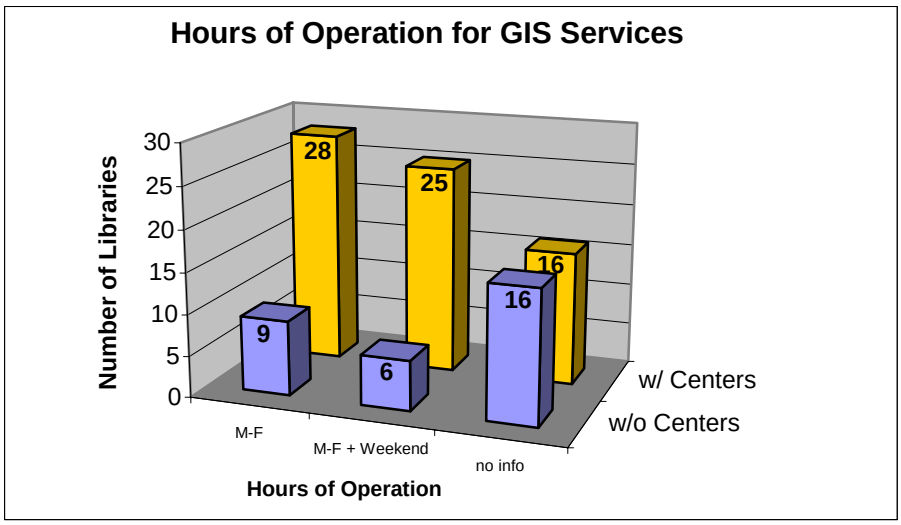

Fig. 4. Hours of operation for library GIS services divided into those libraries with and without centers

Question 5.

How many computers are available for GIS work? *Possible Answers: 1-2, 3+, no info*

Over half (61%) of the locations researched did not have hardware information available on their websites (Fig. 5a). However, those with centers tended to have 3+ computers available, compared to only 1-2 computers available at libraries without centers (Fig. 5b). Our center is among the 27% of library labs with 3+ computers.

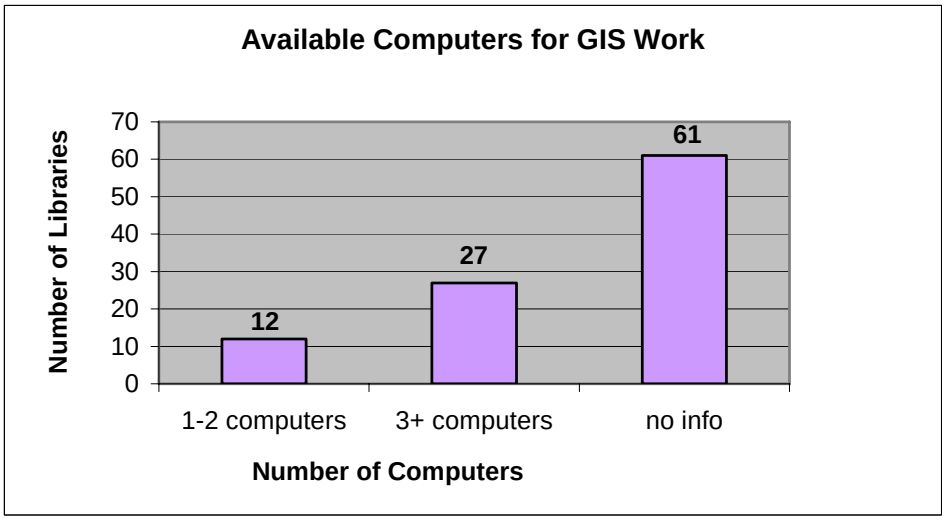

Fig. 5a. Number of available computers for GIS work

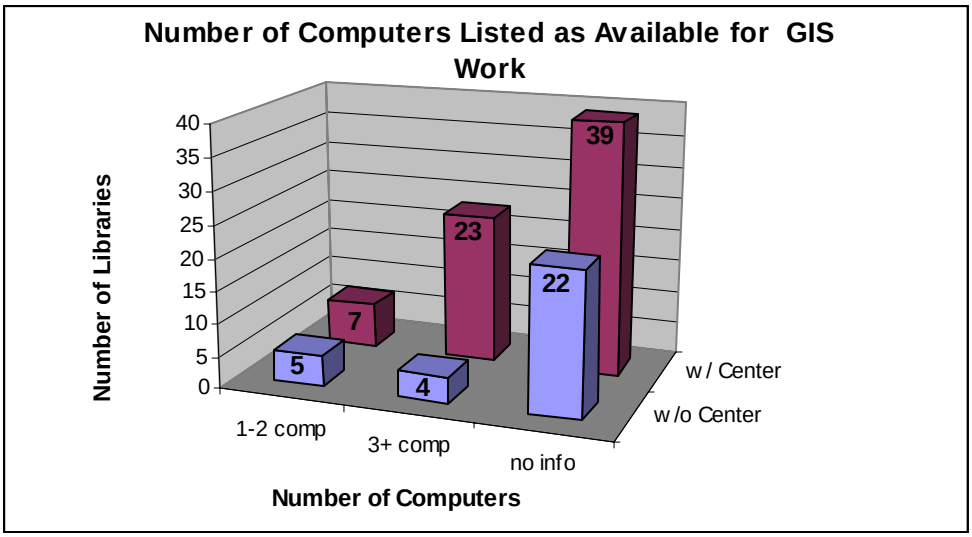

Fig. 5b. Number of available computers for GIS work divided into libraries with and without centers

Question 6.
What software is available?

Possible Answers: a. GIS, b. a+Graphics, c. b+CAD, d. c+Statistics, e. no info

Almost half (48) of the one hundred libraries researched did not have software information listed on their websites (Fig. 6a). However, the other half seems to carry a wide array of GIS, graphics, CAD, and statistics software. If we break down the libraries into those with GIS labs and those without labs we can see that those with labs carried a more diverse list of software packages (Fig. 6b). The libraries without labs seemed to have at least one GIS software package. Figure 6c contains a summary of the most common GIS, graphics, CAD, and statistics software packages seen in all libraries. The last two non-shaded columns show additional GIS viewers, browsers, and common network and desktop applications that were not used in reporting the results under this question, but that were available at some libraries (Fig. 6c).

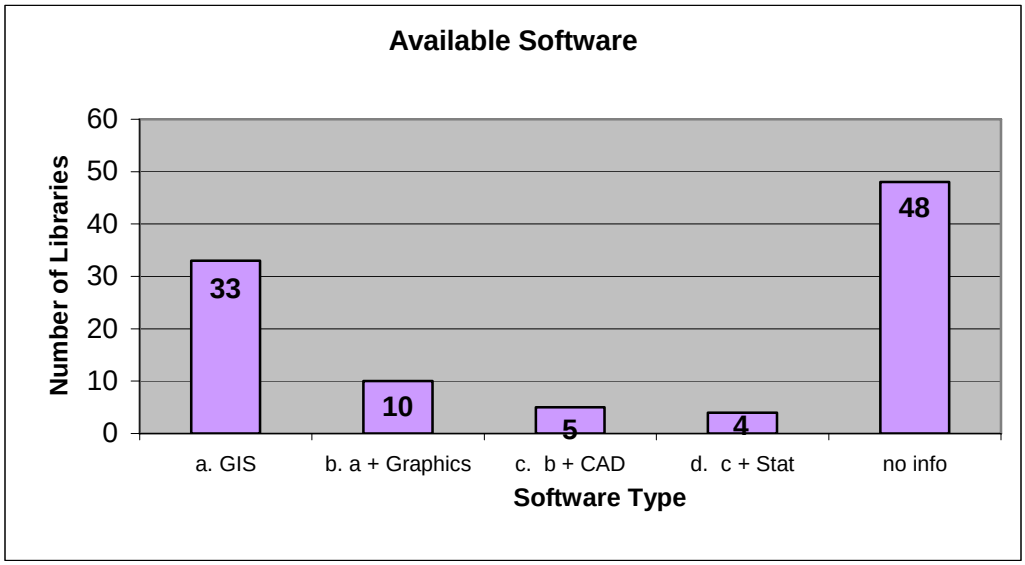

Fig. 6a. Type of software available for GIS related work.

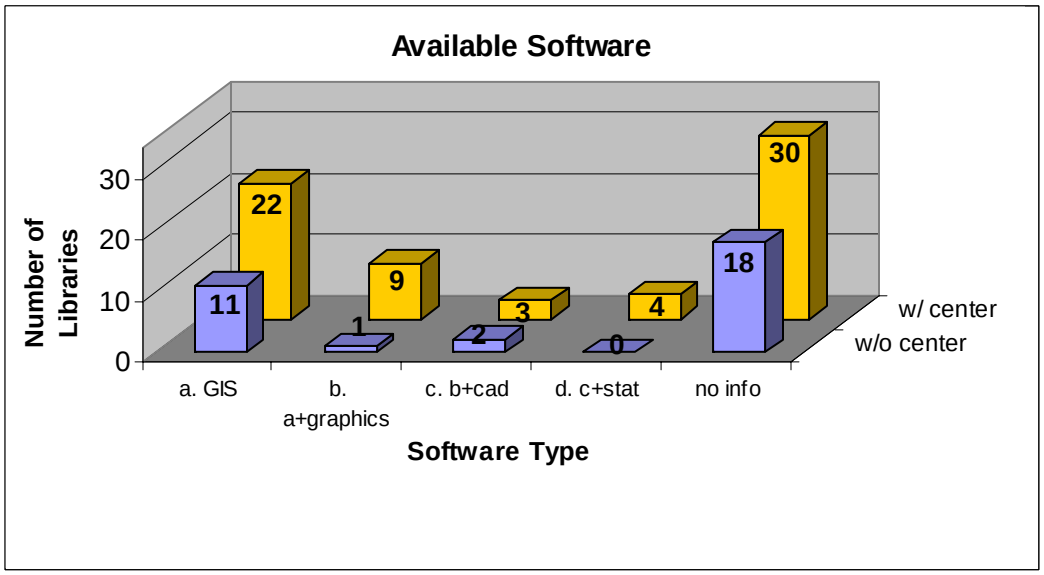

Fig. 6b. Type of software available for GIS related work divided into libraries with and without centers

GIS	Graphics/Raster	CAD	Viewers	Other
ESRI Suite MapInfo Global Explorer Centennia Eartha Global Explorer FME GMT Pcensus Maps 'N' Facts Map 'N" Go Map Expert MapArt	CorelDRAW Adobe Suite (Acrobat (Professional, Reader), Illustrator, PhotoShop) Flash Autodesk 3D Studio Max Dreamveaver PhotoFinish Freehand Erdas Imagine ERMapper Idrisi ENVI	AutoCAD (Map) MicroStation	GeoExpress View Global Mapper MrSID Viewer	SSH WebCT WinZip MS Office FTP Splus Telnet Client Quicktime
		Statistics/Data/ Computation	**Browsers**	
		SPSS ,SAS, Stata GeoCalculator PCI Geomatica Mathematica MatlabR12 Beyond 20/20 Maple6 IDL	IE Netscape Mozilla	

Fig. 6c. Common software packages available at libraries

Question 7.
Are there mainly on-line reference resources in that particular library?
Possible Answers: Yes, No

The type and amount of on-line content varied from libraries to libraries. The vast majority (85%) offered more than just on-line information (Fig. 7). However, there were some libraries (13%) that provided mainly reference links and basic information about what GIS is, or links to vendor and data sites. From these results and from the rest of the survey questions we could distinguish between different types of GIS servicing levels within libraries and divide the libraries into four levels of services:

Level 1– Basic GIS information and reference links on website
Level 2 – Basic GIS information plus some limited assistance (limited hours and personnel)
Level 3 – Basic GIS information, software/data assistance, and some limited training (more software resources, and training)
Level 4 – Basic GIS information, software assistance, more formal training, and advanced data, analysis, and research services (more software and one-on-one help)

Many factors like library size, and available hardware, software, and personnel resources determine the service approach taken by libraries. Our center falls within level 4 with more comprehensive GIS services.

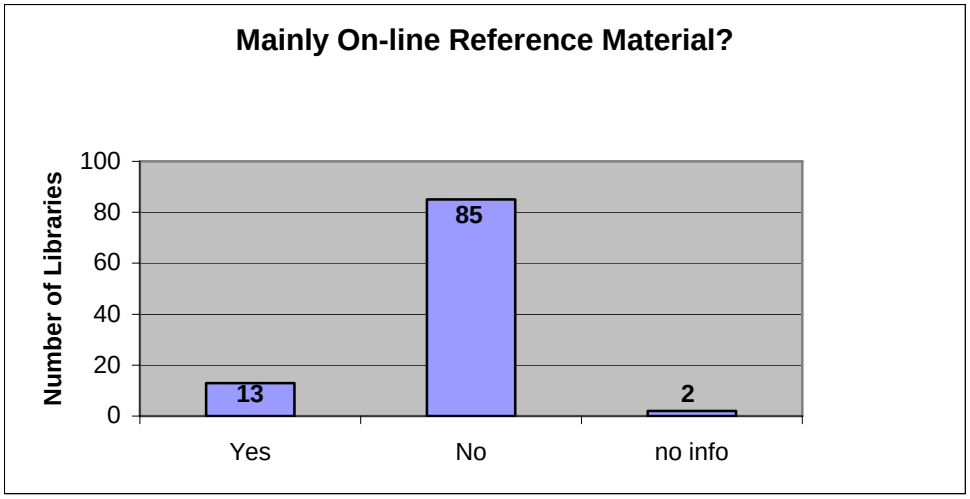

Fig. 7. Number of libraries providing only on-line content

Closing

Many critical questions start to arise when evaluating your own service approach, questions like: How is our approach different from that of other institutions? What is unique about us? What could we be doing that we are not currently doing? What can we learn from others? Are we in a position to give advice? If so, what advice can we give others? All of these are very important questions for future effective planning.

After analyzing survey results we've come to the conclusion that we use a very common approach to provide GIS services. We are a library center (within 69% percentage) open Monday-Friday (within 68% percentage) with two employees (within 10% percentage) that provide GIS services, research and data using 3+ computers (within 25% percentage) and GIS software (within 50% percentage). Judging from the list of available services at other libraries, we do have a stronger emphasis on research, whereas others concentrate more on either data distribution, instruction, or are highly specialized as a state data clearinghouse or a large map repository. Our library GIS center fits well within our small university and makes sense. However, we've also learned that we have room for improvement in the areas of data distribution, instruction, and in the way services are offered.

There is a strong need for more distribution of data not only throughout the library but also throughout the campus. And, although there are some licensing issues that prevent certain data sets from being distributed, the infrastructure is there to have data more easily accessible via the network for other labs and centers to use throughout the campus. Soon new servers and additional workstations will facilitate some of the data exchange and distribution.

An on-line instruction manual could also be added to provide an alternative to our list of short courses. Although our list of short courses is comprehensive, on-line training manuals could complement the short courses and ESRI's Virtual Campus training now available at Rice. These training materials could either be content specific such as dealing with City of Houston planning data, or general how-to manuals.

Our center currently is open Monday through Friday from 9:30am to 5:30pm. These hours have proven convenient to most patrons, especially those who use the center regularly. However, with only two staff members in a walk-in environment, balancing tasks can be tricky when trying to do daily support, independent research, outreach activities, and administration all at the same time. The idea of providing some kind of GIS help desk to track and prioritize requests would probably help patrons identify and detail their needs when making an initial request, and would also provide information for staff to prepare a response or dataset for a patron before an initial visit. Furthermore, a help desk would facilitate planning and provide a rich knowledge database. A data request form will soon be added to the center's new website in order to provide our patrons with instant access for answering quick questions. The idea of a GIS help desk will be further analyzed as we move forward with assessing the GIS needs of the different Rice departments.

Overall our center is in good shape, and we are continually taking steps to improve the way we service patrons. We are very much like many other library centers throughout the US and Canada, but we are also very unique and can only strive to improve the way we respond to our patrons without losing sight of the trends in GIS services and technologies. So how do we do GIS? By addressing one issue at the time, with lots of dedication to what we do, and by balancing the resources we have.

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