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Attached is the final report from the Geographic Information Systems (GIS) Task Force. The report includes:

- A summary of the current use of GIS on the Vanderbilt campus
- An overview of what is being done with GIS at comparable institutions
- Recommendations for the future of GIS at Vanderbilt University

In summary, the Task Force recommends that the Heard Library take a more active role in providing GIS services.

## **Mission of the Geographic Information Systems (GIS) Task Force**

Purpose: To understand and explore GIS service possibilities for the Vanderbilt University Heard Library.

### **Task Force Members**

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### **Definition of Geographic Information Systems (GIS)**

GIS is a system of computer software, hardware, and geographically referenced data. It requires skilled staff to manipulate, analyze, and present this type of spatial information. It is useful to view GIS as a process rather than a thing.

GIS includes:

- data input
- data collection, storage, retrieval, and representation
- data management, transformation, and analysis
- data reporting and product generation

GIS supports decision-making and is far more than a software or hardware product. Policy and decision makers use GIS to understand the correlation between numeric data and geographic references. For example, a health service agency may use GIS to determine the most appropriate location for a new prenatal clinic based on birth rates, income levels, and the presence of other medical facilities in a given area.

### **GIS Development Trends**

The immediate future will be a time of explosive growth in the development and use of GIS technology. Advances in hardware, parallel processing, specialized data sources, data sharing, and data gathering via remote sensing will have a significant impact on the state of GIS.

- Early adopters of GIS at many institutions tended to be in Geology/GeoSciences departments.
- As GIS became more common and the US Government began to release data sets, the GIS function shifted to more central areas such as data centers and libraries to support broader social sciences research.
- The United States Geological Survey is creating the National Map <http://nationalmap.gov/> as a consistent framework for geographic knowledge using GIS technology. It provides public access to high-quality geospatial data and information to support decision-making by resource managers and the public. The National Map is the product of a consortium of Federal, State, and local

- partners who provide geospatial data to enhance America's ability to access, integrate, and apply geospatial data at global, national, and local scales.
- According to the Tennessee Geographic Council, free spatial data access will explode over the next two years. See this link for information about GIS in Tennessee <http://www.tngic.org/>.
  - In 1992, ARL began the GIS Literacy Project. In 1997, they conducted a survey of all 121 participants. By 1999, 89% of the participants offered some level of GIS service. <http://www.arl.org/info/gis>

### **Environmental Scan - GIS at Comparable Institutions**

During this phase, a first-level assessment of GIS presence was completed. To this end, we reviewed the institutions' websites to see how visible the GIS service is, where it is located in the organization (library or other department), and the extent of the services and staff.

In compiling the list, three groups were combined:

- Comparable institutions from the Heard Library Strategic Plan
- Institutions represented on the ALA Map and Geography Round Table (MAGERT) Geographic Technologies Committee members
- Other regional institutions having a recognized GIS function

The list of comparable institutions is as follows:

- Brown University
- Case Western Reserve University
- Duke University
- Emory University
- Johns Hopkins University
- MIT
- Middle Tennessee State University (MTSU)
- Princeton University
- Rice University
- Syracuse University
- Tulane University
- University of Chicago
- University of Connecticut
- University of Kansas
- University of Kentucky
- University of Minnesota
- University of Rochester
- University of Tennessee – Knoxville
- Washington University
- Yale University

## Environmental Scan – Summary of Comparable Institutions

[Summarized Survey of Comparable Institutions \(.doc\)](#)

[Comprehensive Survey of Comparable Institutions \(.xls\)](#) (where data differs in this document from the Summarized Survey, the data in the Summarized Survey is correct. This document is an initial Task Force working document.)

The following key points were extracted from the information gathered about the comparable institutions. There are numerous ways to organize GIS services in the academic environment. While there is no norm, there are common characteristics.

Highlights of the comparable institution review are:

- The Task Force surveyed a total of twenty comparable institutions. All have a GIS presence on campus.
- All twenty institutions offer GIS courses within one or more discipline.
- All of the surveyed institutions are a part of the Federal Depository Library Program.
- Eighteen institutions have GIS presence through the library. Those without apparent library involvement include Washington University and MTSU.
- Fifteen of the institutions appear to have a librarian who is either partially or completely focused on GIS.
- Fifteen institutions offer or coordinate GIS training/instruction through the campus library and staff.
- Twelve institutions have dedicated GIS staff and/or space, regardless of where it is located in the organization.
- The Emory University Library has incorporated GIS into its strategic initiatives, with current plans to hire a GIS Librarian.

In the summarized spreadsheet linked above, GIS services are categorized by four levels, defined as follows, with most institutions providing service at Level Three:

- **Level One:** GIS courses offered with no corresponding mention of data access, software, or equipment
- **Level Two:** provide access to data, software and equipment to support GIS courses, assistance in finding appropriate data, and basic training in troubleshooting software and hardware
- **Level Three:** provide access to data, software & equipment to support GIS courses, assistance in finding *and manipulating* appropriate data, higher-level training and assistance in using software and equipment
- **Level Four:** same as Level Three, with the addition of producing maps for users

## Environmental Scan – GIS at Vanderbilt University

A review of GIS activities on the Vanderbilt campus was compiled from surveys and additional data. GIS occurs primarily via faculty and graduate students' coursework or research. While the software and hardware are in place on campus and used by various departments, it is clear that instruction, teaching, and technical support for GIS are not centralized.

- GIS Campus Survey results:
  - In Arts & Sciences and Engineering, 544 faculty members were surveyed in 42 academic departments and programs. Of those, 10 faculty members in 5 departments have integrated GIS activities in research and/or classroom activities. There were 38 responses (7%) with 10 in the affirmative about use or interest. The academic departments actively using GIS are: Anthropology, Biological Sciences, Earth & Environmental Sciences, Economics, and Psychology.  
The A&S Microcomputer Labs provide GIS software and hardware resources in the following computer labs: Stevenson Center (SC2200), Garland Hall (Room 119), the Branscomb Quad (Lupton 1010), and the Science & Engineering Library Map Room (SC3211).  
[Results of GIS Survey of the School of Arts and Sciences \(.xls\)](#)
  - In The Owen Graduate School of Management, 55 faculty members were surveyed. There were 9 completed (16%) responses, with one professor including GIS as part of a course lecture and another professor using it in research.
  - According to Karen Montefiori in ITS Software Management, the following Vanderbilt units have independently purchased GIS software from ESRI (<http://www.esri.com>):

A&S Microcomputer Labs  
Campus Planning  
Census Information Center  
Civil and Environmental Engineering  
Economics  
Electrical and Computer Engineering  
Geology (Earth and Environmental Sciences)  
Human and Organizational Development  
Owen Graduate School of Management  
Peabody Library  
Plant Services  
Psychology  
Vanderbilt Institute for Public Policy Studies

- GIS in the Heard Library:
  - The Peabody Library currently houses the Vanderbilt Census Information Center. The mission of the CIC is to make census data available to underserved communities and assist them in the interpretation and use of that data for planning and decision-making. In past years, the Vanderbilt CIC, in addition to providing access to census data, has provided workshops and customized maps. Peabody College is reviewing the location of the CIC. The Memorandum Of Agreement with the Census Bureau (<http://www.census.gov/clo/www/cicmoa.html>) expires in January 2006.
 

Within Peabody College, three of the five departments have used GIS through the CIC for faculty and student teaching and research. Currently, Peabody faculty use the CIC for instructional and research support and are not in favor of a centralized GIS service.
  - The Science and Engineering Library provides limited support for GIS activities in the Map Room (SC3211). Two Windows workstations, maintained by the College of Arts and Sciences Computer Labs, have ArcGIS or GRASS software installed. The library also makes available a certain number of geospatial data CDRoms produced by the U.S. government and received on deposit.
  - In the Central Library, there is interest in providing GIS service to meet the needs of social science faculty and students. Data sets for use with GIS are available through the Central Library, though equipment and software are not. As a Federal Depository, the Library receives and provides access to government publications, including electronic resources that contain geographically referenced data. In addition, the Data Services Librarian is the Designate Representative to ICPSR and assists users in locating numeric data sets that often have a geographic component. Due to the lack of equipment, software, and expertise, Central Librarians currently refer patrons with GIS needs to the Science & Engineering Library.
  - The Biomedical, Divinity, Law, and Music libraries report no GIS activity. There may be some interest in GIS at Biomedical and Divinity, but Law and Music do not have any interest or related queries at this time.

### **Examples of GIS in the Heard Library**

This section contains examples of information needs that could have, or did, benefit from GIS services.

## **Students:**

Biological Sciences Graduate Students: Use GIS equipment in the Science and Engineering Library for their research on species distribution.

Earth & Environmental Sciences Students: Use the GIS equipment in the Science and Engineering Library to create maps for their projects.

Peabody Graduate Student: Used CIC to map crime data on Metro-Davidson County and then sorted it by zip code and incident type. The data is being used in the student's dissertation to characterize the neighborhoods in which he conducts his research.

A&S Student: The student was looking at information on the number and location of volunteer fire departments in Tennessee and Georgia, as well as demographic information about the communities they served. The student mentioned that having a map of the information would be very useful.

School of Nursing Students: Students conduct community health assessments that compile information on the physical environment, land use, demographic information, and vital statistics. This type of data lends itself well to GIS and the inclusion of maps within the assessment could increase the effectiveness of the assessment as a tool.

## **Departments & Faculty:**

Faculty and students in the Anthropology Department have used the GIS workstations located in the Map Room of the Science and Engineering Library for coursework and research. In particular, students in Professor Estrada-Belli's course, *Introduction to Geographic Information Systems and Remote Sensing* (ANTH 280) have been frequent users of the GIS facilities.

At least six faculty members in Peabody College have utilized the GIS services of the CIC.

A Vanderbilt University Medical Center department used GIS services through the CIC to analyze data for inclusion in a grant proposal.

Researchers at Vanderbilt used maps generated by the CIC to illustrate the distribution of persons in poverty, those without a high school diploma, and the location of educational institutions and job training facilities across Tennessee.

## **Community Members:**

A local community organization used CIC data to map the density of foreign-born residents of Davidson County, represented by country of origin. The map was used in a

meeting with local government leaders focusing on issues related to immigration services for newly arrived residents.

Local public school administrators used CIC data and services in developing their school improvement plans.

### **Task Force Recommendations**

The GIS Task Force recommends that GIS be included as an extension of the Digital Library initiative at Vanderbilt University. We believe that GIS is a viable and desirable service component for the Libraries and meets the goals of the Library Strategic Plan. The GIS Task Force recommends that a centralized GIS service be implemented in order to avoid duplication of staff and resources. This is in accordance with the Strategic Planning Organization Task Force's Report, which has outlined a need for more centralized services.

Providing GIS service is complex and requires software licensing fees, hardware costs, and skilled staff to support the requestors' needs for GIS data. Initially, it will be necessary for Library administration and the Strategic Planning Steering Committee to determine the relative priority and level of GIS service. In addition, an ongoing financial commitment is needed for overhead costs including: software, hardware, staff development, and technical support. Funding may be addressed through possible University-wide sponsorship, the Library's budgeting process, procuring grant monies, or a combination of these revenue streams.

The Census Information Center should be retained as function of the Heard Library in order to maintain access to the data from the Census Bureau and to continue providing service to the community. Possible relocation of the CIC from Peabody to another Heard library should be discussed before the current contract expires. The CIC serves an important outreach function to the community beyond the Vanderbilt campus by providing access to data and basic assistance in using GIS applications.

Since employees with GIS knowledge are in short supply, this presents a unique hiring situation. While a GIS specialist could be recruited, another option is to invest in a current employee and develop his/her skills. In either case, staff retention will be a critical factor.

As an extension of the Heard Library's educational and literacy mission, it makes sense that GIS support be at the instructional level. As this is a unique type of information requiring specialized training and strong technology skills, it is recommended that the GIS coordinator be focused on this area as a primary job function.

### **Recommended Levels of GIS Implementation**

Campuses with an active GIS presence offer a wide range of services. In the comparable institution survey, it varies in the following areas: staffing, library involvement,

instruction, space, and services. The assessment showed that most institutions provide GIS at Level Three. *Level One is below the norm for comparable institutions and Levels Three and Four require too intense an initial investment for Vanderbilt.*

We recommend that the Heard Library provide Level Two GIS service, including initial and ongoing training for at least one professional staff member. Basic training is also needed for all reference staff to recognize questions that could benefit from GIS. Any level of GIS service will require funding for training and the maintenance and upgrading of equipment and software.

The Task Force further recommends that the GIS service be reviewed at a later time in conjunction with developments in GIS technologies and users' expectations.

### **Future Action Items for Consideration**

- Determine the appropriate and relevant role for GIS as an extension of the Vanderbilt Digital Library
- Work on a campus-wide basis with academic departments to create a dedicated GIS campus function to support teaching and research activities
- Fully examine required resources and expertise (staff support, technology needs, etc.) to properly implement GIS to the “desired level” on campus
- Develop GIS presence, as appropriate, on Heard Library webpages
- Create and deploy training for all public services staff so that they can recognize when GIS is an appropriate information solution to a request
- Centralize GIS service on campus to ensure the quality of services and to reduce associated costs for training, equipment, and software
- Provide centralized instruction and research support for GIS
- Facilitate a campus-wide GIS interest group to solve problems, share knowledge, and work together to support Vanderbilt's GIS needs
- Serve as a clearinghouse for information about GIS use on campus (see UTK's example at <http://www.lib.utk.edu/cic/gis@ut/>)

## Appendix A

### GIS Recommended Links and Readings

#### Websites:

Document: GIS in Higher-Ed Libraries

This is a compilation of returns from a survey that Emily Miller (University of Missouri) sent out in April 2004 to various GIS Librarians.

[http://www.lib.ncsu.edu/risd/staff/essic/univ\\_gis\\_survey.doc](http://www.lib.ncsu.edu/risd/staff/essic/univ_gis_survey.doc)

US Census Bureau list of Census Information Centers

<http://www.census.gov/clo/www/cic.html>

Peabody's Census Information Page

<http://www.library.vanderbilt.edu/peabody/cic/index.html>

#### Articles

Shuler, J.A., et. al., Spatial data and data centers. *The Journal of Academic Librarianship* v. 27 no. 5 (September 2001) p. 391-3

Packard, V.L. Create your own world: what's available with GIS [geographic information systems on the Web]. *College & Research Libraries News* v. 60 no. 3 (March 1999) p. 165-9

Osorio, N.L., reviewer The History of geographic information systems. *Issues in Science & Technology Librarianship* no. 21 (Winter 1999)

Yu Lixin. Geographic information systems in library reference services: development and challenge. *The Reference Librarian* no. 60 (1998) p. 87-110

Soete, G.J. Issues and innovations in geographic information systems. *Association of Res. Libs. Office of Mgt. Services*, 1997. 39 p.

Clarke, K.C. Getting started with geographic information systems. Prentice-Hall, 1997. 353 p.

Hernon, P. GIS as a service option. *The Journal of Academic Librarianship* v. 23 (May 1997) p. 235-7

Van Brakel, P.A., et. al., Geographic information systems: how a World Wide Web presence can improve their availability. *The Electronic Library* v. 15 (April 1997) p. 109-16

Jantz, R.C. Geographical information systems at Princeton University: evaluation and exploration of a new library service. *Collection Building* v. 16 no. 3 (1997) p. 125-36

Spiegel, S., et. al., Promoting Geographic Information System Usage Across Campus. Computers in Libraries v. 24 no. 5 (May 2004) p. 10-12, 14, 16

Kinikin, J. and Hench, K. Survey of GIS Implementation and Use within Smaller Academic Libraries. Issues in Science and Technology Librarianship (Spring 2005). <http://www.istl.org/05-spring/refereed-1.html>

### **Books**

Getting to Know ArcGIS Desktop  
Second Edition Book with CD

by Tim Ormsby, Eileen Napoleon, Robert Burke, Carolyn Groessl, and Laura Feaster  
ESRI Press, 2001, 552 pp.  
ISBN: 1879102897.

GIS Concepts and ArcGIS Methods

by David Theobald  
David Theobald, 2003.

GIS for Everyone, Third Edition

by David Davis  
ESRI Press 2003, 160 pp.  
ISBN: 1589480562.

GIS Fundamentals

by Paul Bolstad  
Eider Press, 2002, 424 pp.  
ISBN: 971764700.

Thinking About GIS: Geographic Information System Planning for Managers by Roger

Tomlinson ESRI Press, 2003, 240 pp.  
ISBN: 1589480708.

Connecting Our World: GIS Web Services

by Winnie Tang and Jan Selwood  
ESRI Press, 2003, 160 pp.  
ISBN: 1589480759.

Unlocking the Census with GIS

By Alan Peters and Heather MacDonald  
ESRI Press, 2004, 330 pp.  
ISBN: 1589481135

Arc Hydro: GIS for Water Resources

by David Maidment  
ESRI Press, 2002, 218 pp.

ISBN: 1589480341.

Geographic Information Systems for Business

By James B. Pick

IDEA Group Publishing

ISBN 1591404002.