
Introduction

JAIME STOLTENBERG

Geographic Information Systems (GIS) data collections and services within the library environment are not new concepts. For years libraries have been active in collecting geospatial data and handling GIS-related reference questions. In the early 1990s librarians often contributed to the literature while researching and learning the best methods for developing geospatial collections and incorporating GIS services in libraries. But during the last ten years, while there have been enormous advancements in the field, the literature related to GIS in libraries has been somewhat scarce. In a time when librarians are busy perfecting their technical GIS skills, creating and defining service models, working closely with data producers, discovering new ways of building collections, and researching ways to archive and preserve digital geospatial data, it is only appropriate that the current issues and topics within the field of GIS librarianship be highlighted in the literature.

In this first-ever issue of *Library Trends* dedicated to GIS and libraries, we present thirteen authors contributing ten profoundly informative articles that address a variety of current issues and trends in the field. These authors share their experience, expertise, and opinions regarding the most prominent concerns within the field of GIS librarianship today. In an effort to create a comprehensive issue that spans the most current and relevant topics, careful consideration was made in the selection of articles included in this issue.

This introduction provides a brief overview of the topics covered in this issue and gives readers a taste of the diversity of these topics. Readers will see emerging trends among the topics in several articles, particularly those related to geospatial data acquisitions, distribution, and preservation. They will also gain exposure to new ideas related to GIS mentoring programs,

analysis of GIS reference statistics, the application of centralized and distributed GIS service models, and geoarchiving.

The issue of how libraries acquire geospatial data is a prevalent one in this collection of articles. Many of the articles discuss the subject but focus on different aspects of building data collections. One author has devoted his entire article to geospatial data collection development. Patrick Florance from Tufts University presents some of the current issues related to building geospatial data collections within libraries. He begins with a fundamental discussion of the nature of geospatial data and stresses the importance of understanding data types, formats, and scales. Florance provides examples of some important considerations essential to successful geospatial data collection development: cost, availability, licensing, distribution policies, documentation and metadata, software, and hardware. Along with these examples, he offers suggestions for success based on his experience building the geospatial data collection at Harvard University.

The process by which data are distributed to library users depends on many factors including size, format complexity, and potential restrictions applied to the data as a result of copyright or license agreements created by data producers. Libraries striving to build collections of geospatial data are increasingly faced with a variety of legal issues related to these agreements. Patti Day and Chieko Maene, former Digital Spatial Data Librarians at the University of Wisconsin–Milwaukee, write about their experiences dealing with copyright restrictions and license agreements applied to several sets of geospatial data acquired by the American Geographical Society Library (AGSL). Day and Maene's article includes a well-researched overview of relevant legal issues and a discussion of freedom of information laws at the federal level and open records laws at the state level to help guide other libraries facing challenges in providing access to licensed geospatial data.

Expanding on the subject of geospatial data dissemination, Tsering Wangyal Shawa from Princeton University writes about his experience developing a system to provide library users with the ability to access many different forms of geographic information via the Internet. Shawa explains the processes by which paper map collections are digitized, metadata records are created, and imagery is made available for preview and direct download from Princeton's Digital Map and Geospatial Information Center. He provides detailed examples of various software packages and development technologies utilized in the project.

Building relationships with data producers is an essential role a librarian must play in order to ensure library users have the ability to access the wealth of geospatial data being produced today. In a well-researched article, Gail Steinhart of Cornell University writes on the issue of geospatial data collections in libraries, but she focuses more on library–data producer relationships. She discusses the importance of building these relationships and talks about how the formulation of an actual data management and

distribution policy can help define critical parameters within a partnership. Issues taken into consideration on both sides of an agreement include intellectual property rights, liability issues, distribution methods, data management practices, and security risks posed by geospatial data. Steinhart draws on knowledge gained from her experiences formulating a policy for the Cornell University Geospatial Information Repository (CUGIR).

Charging into the frontier of geospatial Web services, Steve Morris from North Carolina State University (NCSU) tackles the opportunities and challenges related to streaming geospatial data and geochiving in libraries. Past trends show many libraries working to build physical or “in-house” collections of geospatial data on disk. Today, data producers are making geospatial data available to the public through geospatial Web services published via the Internet. These geospatial Web services are prompting changes in the way libraries develop their data collections. In cases where a streaming Web service is the only mechanism available to obtain the data, libraries are faced with challenges in managing, maintaining, and archiving this information. Morris addresses important issues related to the role libraries should play in the development and utilization of emerging geospatial Web services and the long-term preservation challenges of these types of data distribution systems. He cites examples from the work being done at NCSU as the result of an award from the Library of Congress’s National Digital Information Infrastructure and Preservation Program (NDIIPP).

While Morris introduces the concern of long-term preservation of geospatial data, Julie Sweetkind-Singer and Tracey Erwin of Stanford University, along with Mary Larsgaard of the University of California at Santa Barbara (UCSB), write specifically on this subject. They define and discuss issues such as data versioning, copyright, the complexity of geospatial file formats, and how these issues pose unique challenges when thinking about the ways libraries can preserve the information contained within geospatial files. Sweetkind-Singer, Erwin, and Larsgaard lay the foundation for their article by discussing the research and development currently taking place with a grant from the NDIIPP, awarded to both Stanford and UCSB. As part of this project, the development of two prototype archives for housing data and the creation of a format registry to describe the data being stored will assist in answering some very important geospatial data preservation questions.

Over the years many libraries have established collections of geospatial data, but how many have developed and implemented GIS services? In a comprehensive account of how the University of Kansas developed a GIS service model, Rhonda Houser describes how libraries can begin to offer services aimed at assisting library users with using GIS software as well as locating and analyzing geospatial data. Creating a service model for GIS in the library is an important activity aimed at meeting the needs of a rapidly growing user community that can span many disciplines. Houser describes

how GIS services including instruction, software training, and GIS project consultation can be implemented in a library. She stresses the importance of utilizing mechanisms like outreach and publicity to ensure that these services are successful and properly meet the needs of users.

Reference services related to GIS can run the gamut in variations of applications, complexity and depth of research problems, technical abilities required to perform analytical operations within GIS software, and challenges in locating the proper data sources. Keeping well-documented statistics on the types of reference questions and how they are answered is a way to create a database of knowledge that could be turned into instructional guides aimed at providing users with quick access to answers to their questions. Until now, research related to the analysis of GIS reference statistics and the quality of GIS consultations in academic libraries is virtually absent in the literature. Abraham Parrish from Yale University describes four years of accumulated reference statistics. He relates the analysis of these statistics to the librarian's ability to provide effective consultations. Based on his database of over 5,700 records, Parrish provides examples of a wide variety of questions, the average amount of reference time spent with each library user, different types of library users utilizing GIS reference services, and total average megabytes of data disseminated to a library user at a given time. He compares GIS reference techniques and processes with other traditional library reference techniques and processes to show how GIS requires more of a "consulting" approach.

GIS services in academic libraries attract users from many departments or centers on campus. To achieve success, services developed within the library should be directed toward the needs of a broad user community and should fit into the larger service model architecture of the university. In an interesting discussion of two different models, Joe Aufmuth from the University of Florida defines both the distributed and centralized models of GIS services and data delivery methods from the enterprise GIS perspective. Viewing the academic library as an enterprise, he compares the advantages and disadvantages of these service models. Following a descriptive explanation of both models, he suggests that for some, the best method for providing GIS services may be the result of a hybrid of the two models. Aufmuth cites specific examples of both service models at the University of Florida and Florida International University.

Reference and instruction services are successful when there are knowledgeable staff members available to assist library users with complex research questions or problems. Kim Ricker of the University of Maryland writes about establishing an effective GIS mentoring program to help train a staff whose goal is to meet the needs of the GIS community on campus. While literature on the general topic of mentoring in libraries is seemingly abundant, Ricker found that articles dealing specifically with GIS mentoring were nonexistent. Her innovative ideas offer a fresh perspective on develop-

ing a mentoring program designed to train a staff capable of handling the highly specialized and technical aspects of GIS reference and instruction services. She includes an informative ten-point framework for GIS mentoring largely based on her experiences implementing such a program with graduate assistants at the University of Maryland.

A shift in how libraries are developing and delivering GIS data collections to library users represents the most definitive trend in the field today. Geospatial Web services, library–data producer relationships, and license or copyright issues are just a few trends that illustrate the different ways libraries now deal with GIS collections and services in contrast to methods of the past.

The purpose of this special “GIS in Libraries” *Library Trends* issue is not only to discuss the current issues within the field but also to provide an opportunity for readers to learn from what other libraries have accomplished with regard to GIS collections and services in the last decade. Through the experiences documented by these authors, readers will learn about new ways to develop and share their geospatial collections, how to create effective service models and mentor staff, why data-sharing relationships are important, and why it is absolutely essential to think about best practices for archiving and preserving geospatial data.

Jaime Stoltenberg is the Map and Geographic Information Systems (GIS) Librarian at the University of Wisconsin–Madison’s Arthur H. Robinson Map Library where she manages a collection of over 500,000 items and provides reference services in all subject areas related to maps, geography, cartography, geospatial data, and GIS. Jaime has experience in the acquisition and management of geospatial data collections as well as GIS software and project management within the academic library environment.